

**TECHNICAL MANUAL
OPERATOR'S MANUAL**

**MULTIPLE INTEGRATED LASER
ENGAGEMENT SYSTEM
(MILES 2000)**

**TACTICAL ENGAGEMENT SIMULATION SYSTEM (TESS)
FOR
LIGHT ARMORED VEHICLE
(LAV-AT)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

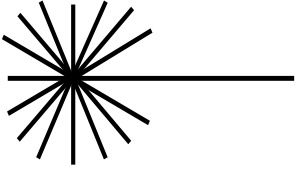
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UNITED STATES MARINE CORPS

27 MAY 2002



LASER WARNING

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- **NEVER fire the laser** at personnel within 10 meters.
- **NEVER look at the laser transmitter** through magnifying optics such as binoculars, telescopes, or periscopes at ranges less than 40 meters.

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SAFETY SUMMARY

WARNING

- Your hearing can be damaged by an ATWESS cartridge. All personnel within 90 meters of an armed ATWESS must wear hearing protection.
- To preclude fragmentation hazards, personnel shall not be closer than 60 meters from an armed ATWESS.
- Never touch the vehicle exhaust equipment when installing or removing MILES 2000 equipment. The exhaust can be very hot and cause severe burns.

FIRE/EXPLOSION WARNING

- Personnel can be killed, burned, or otherwise injured if a pyrotechnic charge in an ATWESS accidentally ignites or explodes.
- **NO SMOKING, heat or open flame**, within 50 feet of an ATWESS.
- A strong shock can set off an ATWESS. Treat ATWESS cartridges as standard ammunition.
- Use safe/proper-handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local standard operating procedures.
- ATWESS cartridges may expel fragments/debris. Maintain prescribed actual weapon back blast danger/caution zones when using the ATWESS, or personal injury could occur.

Tape primer is toxic and highly flammable. Do not spray near heat, open flame, or sparks. Use primer only in well ventilated areas. Do not permit smoking in the area. Injury to personnel may result.

- Visually check the TOW to see if the firing pin is protruding. If it is, **do not** install the ATWESS cartridge as serious personal injury may occur. Fill out the appropriate deficiency form, and return the weapon to the issue facility/authority. Sign out another weapon.

CAUTION

- Use care when starting capscrews not to cross threads. DO NOT use any tools to tighten capscrews until directed.
- Any batteries or otherwise hazardous materials replaced as routine maintenance should be disposed of in accordance with local procedure.
- When attaching connectors, ensure that the plugs and jacks are correctly keyed. If misalignment occurs, damage to the pins may result causing Built-In-Test (BIT) failure.
- Do not attach any cabling, Detector Belts, or the Detector Array over equipment, if it's operation could cause severe damage to the cabling, belt and/or array.
- Do not spill fuel on detector belts or fastener tape. Fuel dissolves the adhesive properties of the tape primer and may cause a detector belt to fall from the vehicle, causing damage or loss of a detector belt.
- Blank fire can heat up the barrel and damage the cables if it touches the barrel.

For information on **FIRST AID**, refer to **FM 21-11/MCRP-3-02G**.

HOW TO USE THIS MANUAL

INTRODUCTION.

This manual contains operation instructions for the Multiple Integrated Laser Engagement System (MILES 2000), Tactical Engagement Simulation System (TESS) when configured on the Light Armored Vehicles (LAVs).

MANUAL DESCRIPTION.

This manual is divided into three chapters. Chapters are further divided into sections. The chapter descriptions are provided in the following subparagraphs:

Chapter 1 is an introduction that provides general information, equipment description and data, and theory of operation.

Chapter 2 provides operating instructions.

Chapter 3 provides operating maintenance instructions.

CHAPTER 1 INTRODUCTION

SECTION I. GENERAL INFORMATION

1.1 SCOPE.

This manual describes how to install, operate, and maintain the Multiple Integrated Laser Engagement System (MILES 2000) Tactical Engagement Simulation System (TESS) when configured on the Light Armored Vehicles (LAVs). The manual also explains all authorized operator maintenance. Refer any maintenance problems not covered to organizational maintenance personnel.

1.2 MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance will be those described by DA PAM 738-750, The Army Maintenance Management System (TAMMS). Marine Corps personnel will use TM 4700-15/ __, Equipment Record Procedures, and refer to the on-line MCPDS or Marine Corps Stocklist SL-1-2, Index of Technical Publications.

1.3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your MILES 2000 equipment for the LAV system needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a Quality Deficiency Report. Mail to us at Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. We'll send you a reply. For U.S. Marine Corps personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report) to: Commander, Marine Corps Logistics Base (Code G316-1), 814 Radford Boulevard, Albany, GA 31704-1128.

1.4 CORROSION PREVENTION AND CONTROL.

- a. Corrosion Prevention and Control (CPC) of material is a continuing concern. It is important that any corrosion problems with this item be reported, so the problem can be corrected and improvements can be made to prevent the problem in the future.
- b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.
- c. If a corrosion problem is identified, it can be reported using form SF-368. Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.
- d. The form should be submitted to Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. U.S. Marine Corps personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report).

1.5 PREPARATION FOR STORAGE OR SHIPMENT.

When receiving equipment for storage or shipment, always inspect the returned equipment for damage, breaks, cracks, and cleanliness.

1.6 LIST OF ABBREVIATIONS AND GLOSSARY.

Refer to Table 1-1 for a list of abbreviations used with the MILES 2000 System, and refer to Table 1-2 for the glossary.

Table 1-1. List of Abbreviations.

AAV	Assault Amphibious Vehicle
AC-DC	Alternating Current/Direct Current
ASAAF	Automatic Small Arms Alignment Fixture
ATWESS	Anti-Tank Weapons Effects Signature Simulator
AVCPS	Audio Visual Cue Pyrotechnic Simulator
BFA	Blank Firing Adapter
BIT	Built-In-Test
CD/TDTD (Controller Gun)	Controller Device/Training Data Transfer Device
CDA	Control Display Assembly
CPC	Corrosion Prevention and Control
CSWS	Crew Served Weapon System
CU	Control Unit
CVC	Combat Vehicle Crew
CVS	Combat Vehicle System
DC-DC	Direct Current/Direct Current
DPCU	Data Processing Control Unit
EIR	Equipment Improvement Recommendation
EOD	Explosive Ordnance Disposal
FCU	Fire Control Unit
FlashWESS	Flash Weapons Effects Signature Simulator
FU	Firing Unit
ID	Identification
I/O	Input/Output
IR	Infrared
ISU	Integrated Sight Unit
ITS	Independent Target System
IWS	Individual Weapons System
IWS Console (DPCU)	Individual Weapons System Console (Data Processing Control Unit)

Table 1-1. List of Abbreviations - Continued.

KSI	Kill Status Indicator
LAV	Light Armored Vehicle
LASER	Light Amplification by Stimulated Emission of Radiation
LED	Light Emitting Diode
LTU	Laser Transmitter Unit
LU	Loader Unit
MARS	MILES After-Action Review System
MCS	Master Control Station
MG	Machine Gun
MGS	Missile Guidance System
MGSS	Main Gun Signature Simulator
MILES	Multiple Integrated Laser Engagement System
O/C	Observer/Controller
OTPD	Optical Turret Positioning Device
PID	Player Identification
Pk	Probability of Kill
PMCS	Preventive Maintenance Checks and Services
PROM	Programmable Read-Only Memory
SAT	Small Arms Transmitter
SMAW	Shoulder-Mounted Assault Weapon
SWS	Surrogate Weapons System
TAMMS	The Army Maintenance Management System
TESS	Tactical Engagement Simulation System
TNB	Turret Network Box
TOW	Tube-Launched Optically-Tracked Wire-Guided Weapon System
TVPC	TOW Vehicle Power Conditioner
ULT	Universal Laser Transmitter
V	Volt
Vac	Volts Alternating Current
Vdc	Volts Direct Current

Table 1-2. Glossary.

Administrative Kill	A kill initiated by the CD/TDTD (Controller Gun) for administrative purposes.
Automatic Small Arms Alignment Fixture (ASA AF)	Device used to align the Small Arms Transmitter (SAT) to the sights on a weapon.
Catastrophic Kill	A kill that totally disables a vehicle or individual.
Cheat Kill	A kill is assessed to a system when a tamper attempt has been detected.
Commo Kill	A kill that disables external communications.
Controller	An umpire or referee in a MILES 2000 training exercise.
Controller Device (CD/TDTD Controller Gun)	A device used by the Controller to upload, download and test the MILES 2000 system.
Fastener Tape	A hook and pile type tape used to hold vehicle detector belts and other MILES 2000 equipment in place.
Firepower Kill	A kill that disables vehicle weapons.
Helmet Harness	The part of the IWS attached to the helmet or soft cover.
Hit	Simulated contact with incoming fire that does not result in a Kill.
Individual Weapons System (IWS)	The Helmet and Torso Harness assemblies and IWS Console (DPCU), which is worn by personnel. This equipment also includes the Small Arms Transmitter (SAT).
Kill	Refer to Catastrophic Kill, Commo Kill, Firepower Kill, or Mobility Kill
Kill Status Indicator (KSI)	A device attached to a vehicle that produces an external flashing light indicating a Hit, Near Miss or Kill.
LASER	Light Amplification by Simulated Emission of Radiation. A narrow beam of light capable of transmitting information.
Laser Beam	In MILES 2000 equipment, an eye-safe, invisible beam of light that simulates weapons fire.
Laser Detector	A device that senses incoming laser beams.
Laser Transmitter	A device that transmits a laser beam.
Main Gun Signature Simulator (MGSS)	A device that produces a flash and bang to simulate main gun firing.
Mobility Kill	A kill that disables the vehicle movement. The crew has 20 seconds to bring the vehicle to a stop. If motion is sensed after the 20 seconds, a Cheat Kill will occur.
Near Miss	Laser fire close enough to be sensed by a laser detector, but not close enough to cause a Hit or Kill.

Table 1-2. Glossary - Continued.

Optical Turret Positioning Device (OTPD)	A device that provides an optical reference signal to the turret detector belts (on applicable vehicles) to determine the turret position with reference to the hull.
Reset	Brings the system to the ready (alive) condition. In a CVS, the reset brings the system to a ready condition and returns ammunition to the default levels.
Resurrect	When a CVS is resurrected, the system is brought to a ready condition, but the ammunition levels remain as they were when the system was killed.
Small Arms Transmitter (SAT)	A laser transmitter used on various individual and vehicle-mounted rifles and machine guns.
Torso Harness	The part of the IWS that is worn on the upper body.
Universal Laser Transmitter (ULT)	A laser transmitter used on various combat vehicle systems mounted on the main gun and the coax machine gun.
Weapon Token	Is embedded in software and allows the IWS Console (DPCU) to enable a SAT. The Weapon Token is transmitted to the IWS when the system is reset/resurrected by the CD/TDTD (Controller Gun). The SAT cannot be enabled without a Weapon Token and will not have one in the following conditions: system is killed or another SAT is enabled with the same Torso Harness.

NOTE

Vehicle kits contain the Small Arms Transmitters (SATs) for the vehicle mounted weapons, but do not include Individual Weapons System (IWS) SATs. IWS equipment is issued separately.

1.7 SAFETY, CARE, AND HANDLING.

Before, during and after operation of equipment, read and adhere to all applicable WARNINGS and CAUTIONS. Perform all preventive maintenance checks and services as scheduled, and report any discrepancies as soon as possible. Use the proper tools and procedures for installation, troubleshooting, removal and replacement of components, and notify higher echelon maintenance personnel when warranted.

Although MILES 2000 consists of ruggedized equipment designed to withstand extreme vibration, shock, and environmental stresses. Treat the equipment with reasonable care. Do not use excessive force when handling, packing, or stowing equipment. Responsible handling and use will help prolong the life cycle and appearance of the equipment.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1.8 EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

1.8.1 Equipment Characteristics. The MILES 2000 LAV system permits the vehicle and crew to take part in realistic combat training exercises. Actual firing conditions of all vehicle weapons are simulated using laser beams. Blank ammunition, and Anti-Tank Weapons Effects Signature Simulator (ATWESS)/Flash Weapons Effects Signature Simulator (FlashWESS) add to the system's realism.

Laser detectors mounted on the LAV sense incoming fire. The MILES 2000 system electronics determine the accuracy and simulated damage of incoming fire. The system also detects the type of weapon directing fire against the LAV.

1.8.2 Capabilities and Features.

- a. Easily installed and removed.
- b. Simulates firing capabilities of the the pintle-mounted M240E1 machine gun, as well as the Tube-Launched Optically-Tracked Wire-Guided Weapon System (TOW) missile launcher.
- c. Blank fire, ATWESS pyrotechnics charges, if used, and FlashWESS add realism to weapon use.
- d. Normal firing procedures used for all weapons.
- e. Detects all incoming fire, identifies incoming weapons and Player Identification (PID), and determines the effect of incoming fire on the using vehicle.
- f. Uses eye-safe laser transmitters.
- g. High visibility Kill Status Indicator (KSI) strobe light signals vehicle Near Miss, Hit, or Kill.
- h. Compatible with all other MILES devices.

1.9 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

NOTE

MILES equipment installation procedures should be followed as outlined in the technical manual. If the following procedures CANNOT be followed due to cable length or additional vehicle equipment, then place the MILES equipment in the best and safest location.

The MILES 2000 for the LAV systems contains the following equipment:

- a. M240 Small Arms Transmitter (SAT). Adaptation for the specific weapon is through a factory set laser power adjustment modifying the encoded personality Programmable Read-Only Memory (PROM), and attaching the weapon specific mounting adapter. The laser power is factory adjusted to represent the specific weapon type and simulate its firing capabilities. A window for the infrared link transmitter and receiver, and a sunlight readable firing indicator is located in the rear cover. The SAT is powered by an internal 3.6-volt lithium battery with a 3-year battery life. The M240 SAT mounts on the pintle-mounted machine gun barrel.

- b. Vehicle Detector Belts and Amplifier. Two (2) vehicle detector belts provide detection coverage for each aspect of the vehicle's vulnerability zones. The detector belts for the LAV-AT are installed on the hull.
- c. Kill Status Indicator (KSI). The KSI is an integrated status indicator that provides information to an attacking vehicle. The KSI is composed of two (2) major functional elements: a visual strobe and the decoder/interface electronics. The KSI also includes the interface inputs for the serial bus interface, and the optical input/output (I/O) port. The optical I/O port provides the optical interface to the Controller Device/Training Data Transfer Device (CD/TDTD Controller Gun) for transfer of vehicle types/Probability of Kill (Pk) data uploading and events downloading. The KSI also includes a motion sensor to detect vehicle motion after a Mobility Kill to allow the Control Unit (CU) to assess a Cheat Kill if motion occurs after 20 seconds.
- d. Tow Tracker Head. The TOW Tracker Head assembly contains the Laser Transmitter Unit (LTU) and CU for the TOW Simulator package.
- e. TOW Simulator Tube. The TOW Simulator Tube is used to represent the encased missile. The Simulator Tube contains the ATWESS, and simulates the effects of firing the TOW.
- f. Control Unit (CU). The CU contains all primary user interface functions, displays, and controls. Weapon selection, ammo selection, loading/reloading of ammunition, and weapon status are functions provided by the CU. The location of the unit is determined by the specific configuration of the vehicle to which it is mounted.
- g. Power Controller. The Power Controller provides 24 Volts direct current (Vdc), the charging voltage for the internal lead acid batteries, as well as power to the MILES 2000 system. The 24-volt (V) battery is converted to 10.5 Vdc output by a direct current/direct current (DC-DC) converter for use by the MILES 2000 kit, and provides backup power for more than 100 hours. The battery also supplies power to the KSI for a 10-minute time period in the event the vehicle's power is turned off and the vehicle is killed. The location of the Power Controller is determined by the specific configuration of the vehicle to which it is mounted.
- h. Modem Unit. The modem unit is installed only on the LAV-AT and aids the CU in sending signals to the TOW. The modem is cabled through the radios, but does not interfere with internal communications.

1.10 EQUIPMENT DATA.

Table 1-3 defines the equipment data.

Table 1-3. Equipment Data.

EQUIPMENT	WEIGHT (POUNDS)	DIMENSIONS L x W x D (INCHES)	STANDARD KILL RANGE (METERS)
TOW Tracker Head, LAV-AT	38.0	5.56 x 10.0	3750
TOW Simulator Tube, LAV-AT	26.2	48.6 x 8.12	
M240 machine gun (SAT)	0.4	1.3 x 1.9 x 2.8	800
Left/Front belt, LAV-AT	3.1	216 x 2.0	
Right/Rear belt, LAV-AT	3.2	235 x 2.0	
Kill Status Indicator (KSI)	5.5	8.5 x 8.2 x 2.5	
Control Unit (CU)	0.97	4.5 x 4.0 x 2.0	
Power Controller	7.9	6.1 x 5.9 x 3.0	
Modem Unit, LAV-AT	3.4	8.5 X 4.5 X 3.5	

SECTION III. THEORY OF OPERATION

1.11 BASIC PRINCIPLES OF OPERATION.

1.11.1 Principles of Operation (MILES 2000). The MILES 2000 system uses laser beams to simulate actual weapons fire. An eye-safe invisible laser beam is sent out by each weapon's transmitter when it is fired. The laser beam is coded and simulates all of the weapon's capabilities including range, accuracy, and destructive capability.

Laser detector systems are used to sense incoming fire. The detector systems register incoming laser beams and determine whether they have scored a Near Miss, Hit, or Kill. Incoming fire can result in more than one type of a Hit or Kill. Types of hits or kills include Mobility, Communications, Firepower, or a Catastrophic Kill of the entire vehicle.

Table 1-4 defines the Kill Indication Chart.

1.11.2 Principles of Operation (LAVs). All weapons on the LAVs are equipped with laser transmitters that are fired using normal weapon operating procedures, with the exception of the TOW missile launcher Simulator Tube on the LAV-AT. (This equipment requires some deviation from normal TOW launching procedures.) The LAV-AT has detector belts mounted on its hull exterior. A CU mounted inside determines the extent of incoming fire and its effect. The KSI is activated when incoming fire is detected. (See Figure 1-1.)

1.11.2.1 M240E1 Machine Gun (all LAVs). The M240E1 machine gun is fired using normal procedures. The gun is fitted with a Blank Firing Adapter (BFA) and loaded with blank ammunition. The sound/flash of blank fire is sensed by the M240 SAT mounted on the machine gun's barrel. The laser transmitter will operate as long as blank ammunition is being fired.

1.11.2.2 Detector Belt Systems. Two (2) detector belts are mounted on each LAV. Each belt is electrically divided into two (2) zones for a total of four (4) zones, which represent the sides of the vehicle. They generate electrical signals that are fed to a decoder in the KSI.

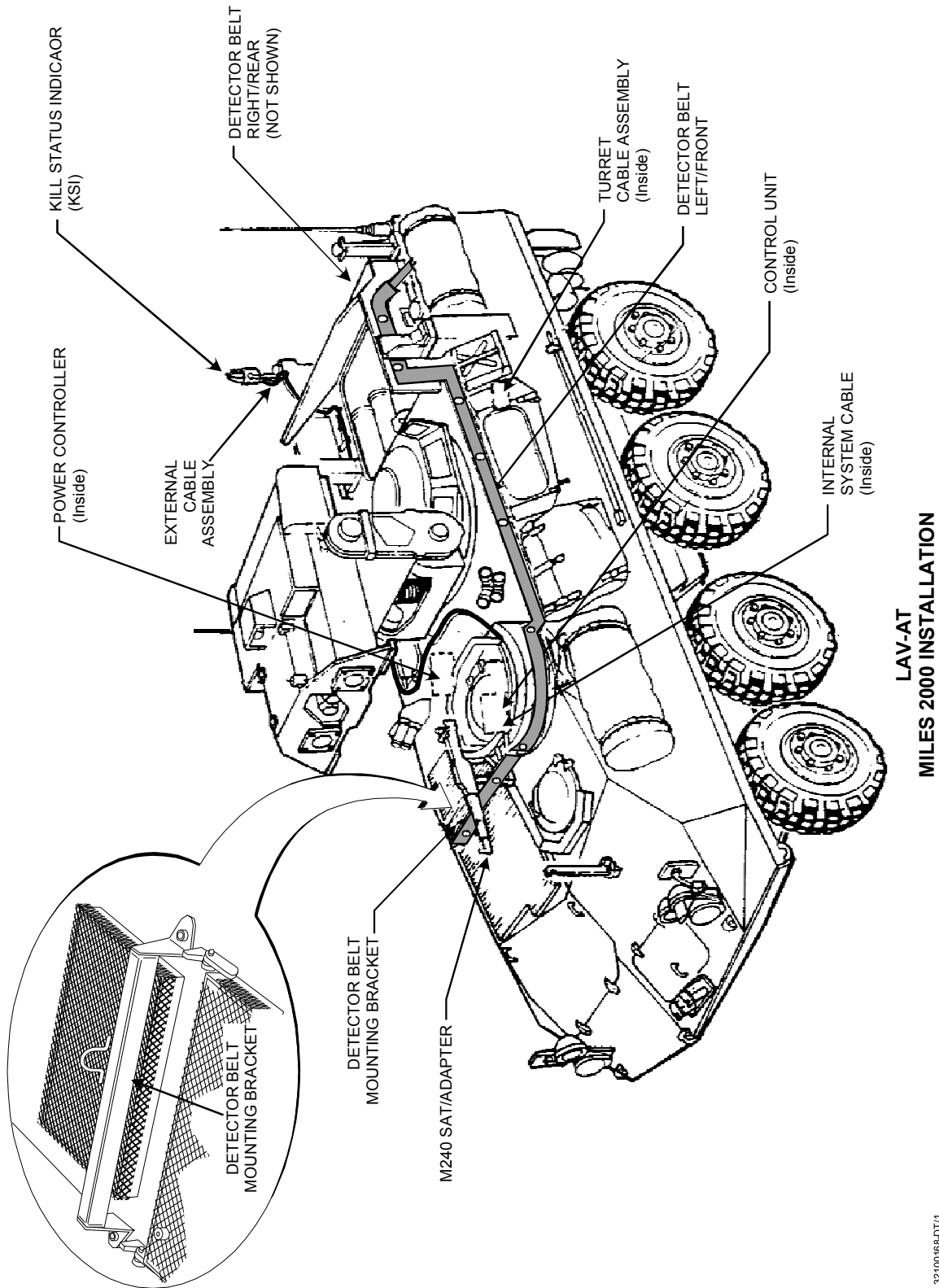
1.11.2.3 Kill Status Indicator (KSI). Receives MILES messages from the detector belts, decodes them and then routes all valid messages to the CU. It has an optical port for external interface with the CD/TDTD (Controller Gun) and a motion sensor. It is mounted to provide 360° visibility of the flashing light. Refer to Table 1-4, Kill Indication Chart for a list of the types of kills and the KSI indications.

1.11.2.4 Control Unit (CU). The CU provides the following: casualty assessment using Pk tables, records/stores event data (500 events max), provides system real-time clock, monitors system for hardware failures and for cheat attempts, commands KSI to flash, and interrupts vehicle external communications during Communications/Catastrophic kills.

1.11.2.5 Power Controller. The Power Controller contains a rechargeable battery pack and operates from the vehicle power to maintain the battery charge. It automatically switches to the internal battery to provide power when the vehicle power drops lower than the internal battery power, or when the vehicle power is removed from the MILES 2000 system.

Table 1-4. Kill Indication Chart.

Type of Hit/Kill	Number of KSI Flashes	Audible Indication
Vehicle		
SMAW Spotting Rifle	1 Flash	None
Near Miss	2 Flashes	Near Miss.
Hit	4 Flashes	Hit.
Mobility Kill	4 Flashes	Hit, Mobility. Stop Vehicle. (The crew has 20 secs to bring the vehicle to a stop.)
Fire Power Kill	4 Flashes	Hit, Fire Power.
Communications Kill	4 Flashes	Hit, Commo Kill. (disables external communications only)
Catastrophic Kill	Flashes Continuously	Vehicle Kill
Administrative Kill	Flashes Continuously	Vehicle Kill
Cheat Kill	Flashes Continuously	Cheat Kill
Reset/Resurrect	1 Flash	Reset/Resurrect
IWS		
Near Miss	N/A	2 Beeps
Kill	N/A	Continuous
Administrative Kill	N/A	Continuous
Cheat Kill	N/A	Continuous
Reset/Resurrect	N/A	4 Beeps
<p>Notes: Cheat Kill will occur during a Mobility Kill if the vehicle does not stop within the allotted 20 seconds or moves after it has stopped. A Cheat Kill will occur when disconnecting any of the following pieces of vehicle equipment: KSI, any Detector Belt/Array, or Power Controller (must be reconnected for cheat to be indicated), or removing the battery on IWS Console (DPCU).</p> <p>The KSI is issued as part of a separate equipment list.</p> <p>In the event of a Catastrophic or Communications Kill, external communications can be over-ridden for EMERGENCIES ONLY by pressing the USER INFO push button on the Control Unit, selecting communication override and pressing the ENTER push button.</p>		



32100168-DT/1

Figure 1-1. LAV-AT.

1.11.2.6 TOW Simulator Tube and Tracker Head Assembly. The TOW system is fired using normal procedures. The TOW Simulator Tubes are loaded with ATWESS cartridges. When the TOW is fired, the ATWESS cartridges detonate providing noise, flash, and smoke simulation of an actual missile launch. The laser transmitter fires after the ATWESS device. After firing the TOW, the number of remaining TOW rounds can be displayed on the CU. In the TOW Tracker Head assembly is the LTU for the dismounted TOW. It provides a control unit, display, and membrane switch keypad which allows the unit to perform Built-in-Test (BIT), and select basic rounds, load and reload. It also allows the user to monitor target tracking. TOW sight must be used to track the target for 15 seconds to obtain a Hit or Kill status. A Hit or Kill indicates that the gunner has properly tracked the target and the 15 seconds simulates a tracking time of an actual missile.

1.11.2.7 Turret Modem. The Turret Modem communicates with the Hull Modem. The modem unit is installed only on the LAV-AT and aids the CU in sending signals to the TOW. The modem is cabled through the radios, but does not interfere with internal communications.

1.11.2.8 Hull Modem. The Hull Modem communicates with the Turret Modem. The modem unit is installed only on the LAV-AT and aids the CU in sending signals to the TOW. The modem is cabled through the radios, but does not interfere with internal communications.

Table 1-5 defines the Kit/Equipment List.

Table 1-5. Kit/Equipment List.

PACKAGE NOMENCLATURE: SIMULATION SYSTEM, COMBAT VEHICLE SYSTEM, LAV-AT VEHICLE				
PACKAGE PERTAINS TO: 146700-2				
PACKAGE CONTENTS				
QUANTITY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
1	KILL STATUS INDICATOR	271105	271105-2	
1	CABLE ASSY, TURRET-LAV-AT	146706	146706-1	
1	TRANSIT CASE, CVS, LAV-AT	146701	146701-1	4
1	SAT ASSY, M240G	148460	148460-1	
1	KIT, TRACKER HEAD, LAV-AT	146731	146731-2	
1	KIT, TOW TUBE, LAV-AT	146730	146730-1	
2	MODEM ASSY, LAV-AT	146715	146715-1	
1	CONTROL UNIT ASSEMBLY	146402	146402-2	
1	MAST ASSY, KSI-LAV-AT	146702	146702-1	
1	POWER CONTROLLER ASSEMBLY	146409	146409-2	
1	CABLE ASSY, INTERNAL-LAV-AT	146704	146704-1	
1	CABLE ASSY, EXTERNAL-LAV-AT	146705	146705-1	
1	DETECTOR BELT ASSY, LEFT-FRONT, LAV-AT	146710	146710-1	
1	DETECTOR BELT ASSY, RIGHT-REAR, LAV-AT	146712	146712-1	
1	BRACKET, DETECTOR BELT, LAV-AT	146714	146714-7	
1	MAST ASSY., 20 INCH UNIVERSAL	146708	146708-2	
8	WEDGE ASSY, DETECTOR BELT	146435	146435-1	
1	OPERATOR'S MANUAL		TD 9-6920-703-10	
1	GROMMET, PERISCOPE SEAL	146509	146509-7	
6	STRAP, 3/4" X 6"			1
6	STRAP, 3/4" X 8"			2
3	STRAP, 3/4" X 12"			3
1 OZ	ANTISEIZE LUBRICANT, 1 OZ TUBE		MIL-A-907	5
NOTES: 1. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170790. THIS REEL CONSISTS OF 1200 STRAPS. 2. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170091. THIS REEL CONSISTS OF 900 STRAPS. 3. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170782. THIS REEL CONSISTS OF 600 STRAPS. 4. MARK THE TRANSIT CASE (2 PLACES) WITH THE APPLICABLE DASH NUMBER AFTER THE BASIC PART NUMBER. THE MARKING SHALL BE 6.35mm HIGH CHARACTERS MINIMUM, COLOR WHITE NO. 27925 IN ACCORDANCE WITH FED-STD-595. LOCATE AS SHOWN ON TRANSIT CASE DRAWING. 5. ALTERNATES: ANTISEIZE LUBRICANT, PART NO. 51001, CAGE CODE 05972, IN 1 OZ TUBE OR PART NO. 767, CAGE CODE 05972, OR PART NO. C5A, CAGE CODE 05972.				

See Figures 1-2 thru 1-6 located at the end of this table.

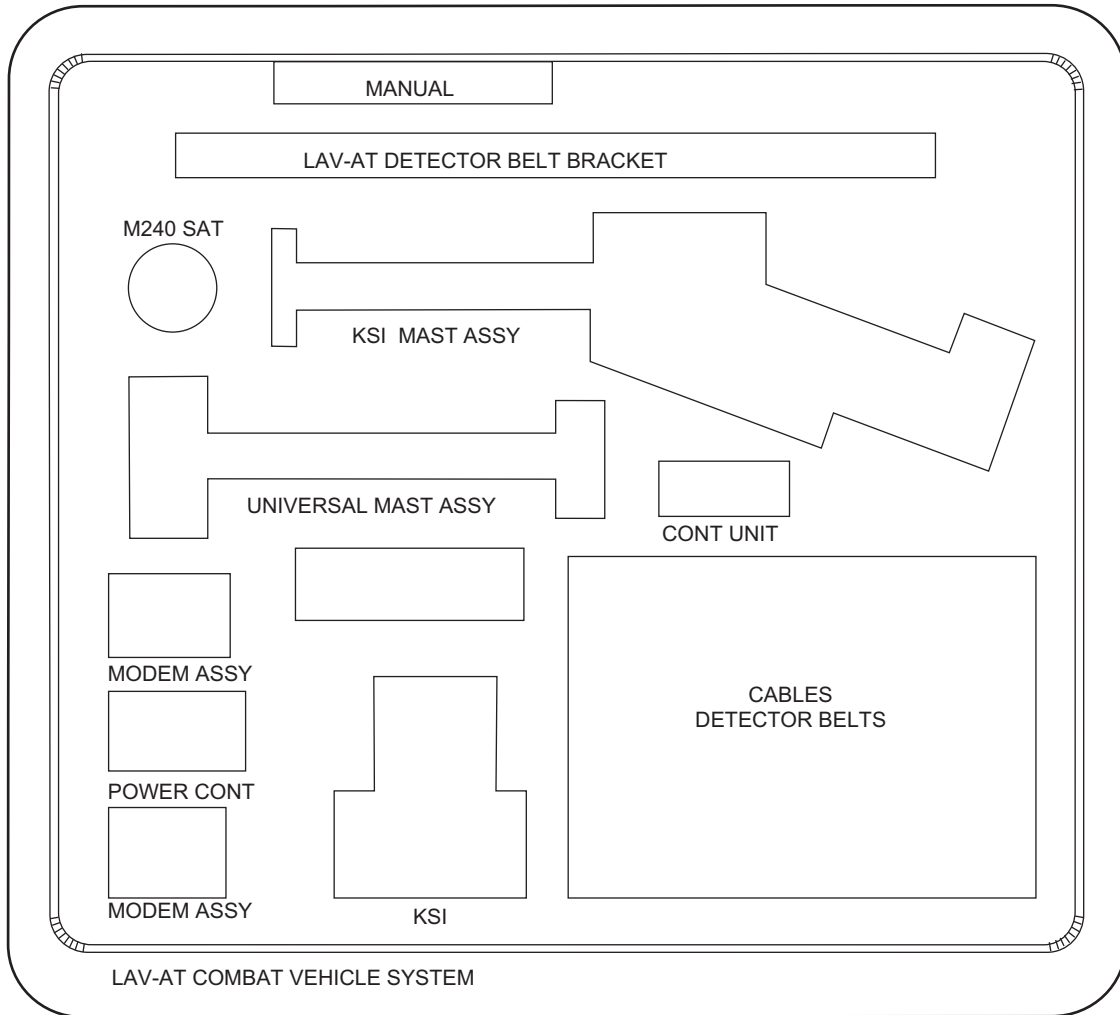
Table 1-5. Kit/Equipment List - Continued.

PACKAGE NOMENCLATURE: TRACKER HEAD KIT, LAV-AT, MILES 2000				
PACKAGE PERTAINS TO: 146731-2				
PACKAGE CONTENTS				
QUANTITY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
1	CONNECTOR ASSY-LOOP BACK	147059	147059-1	
AR	TRANSIT CASE, TRACKER HEAD, LAV-AT	147062	147062-2	1, 2
1	TRACKER HEAD ASSEMBLY, TOW	147080	147080-3	
AR	OPERATOR'S MANUAL		TD-9-6920-703	
NOTES: 1. MAX. QTY. OF 1 TOW TRACKER HEAD KIT MAY BE PACKED IN ONE TRANSIT CASE. 2. MARK THE TRANSIT CASE (2 PLACES) WITH THE APPLICABLE DASH NUMBER AFTER THE BASIC PART NUMBER. THE MARKING SHALL BE 6.36mm HIGH CHARACTERS MINIMUM, COLOR WHITE NO. 27925 IN ACCORDANCE WITH FED-STD-595. LOCATE AS SHOWN ON TRANSIT CASE DRAWING.				

See Figures 1-4 thru 1-6 located at the end of this table.

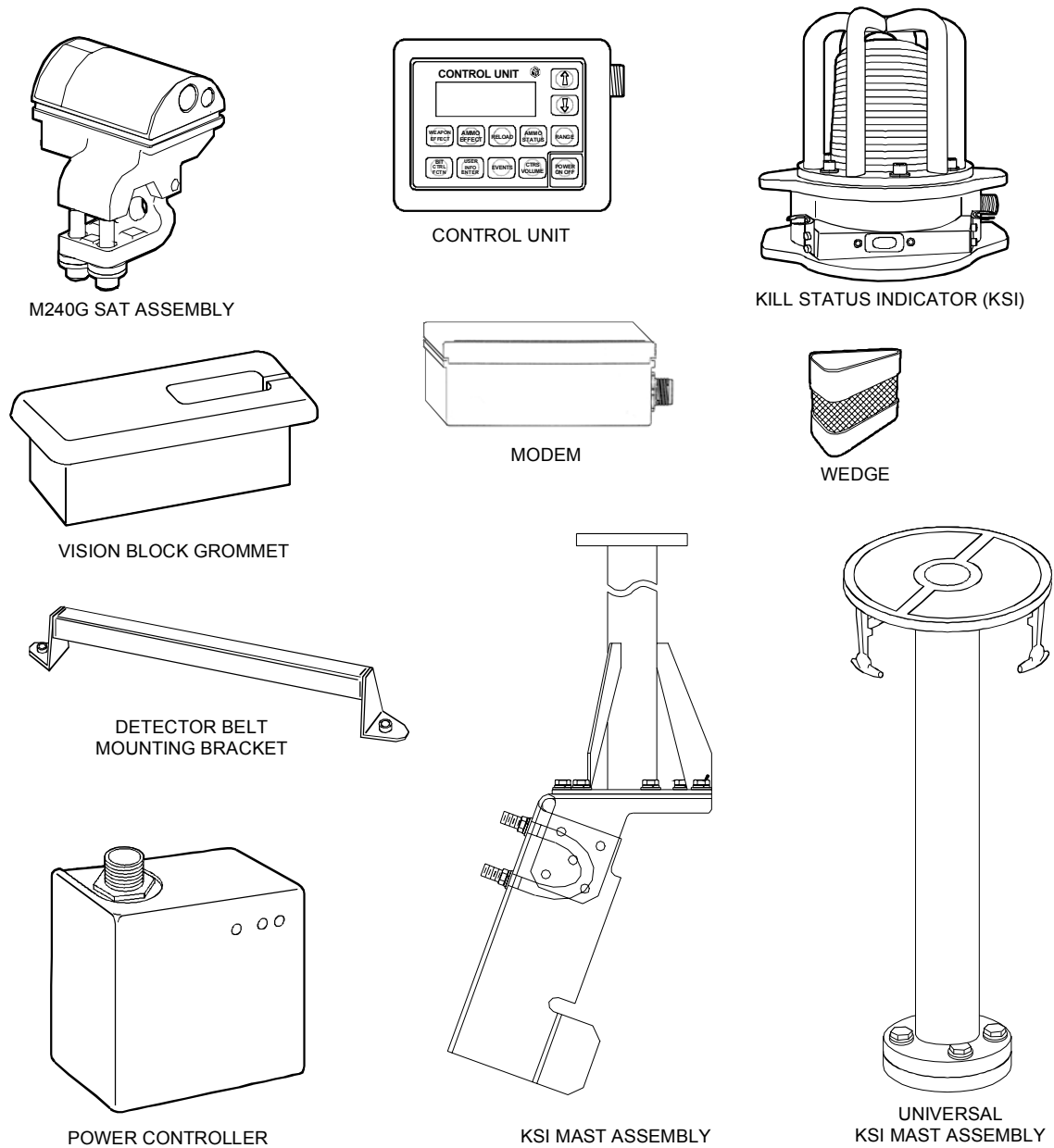
PACKAGE NOMENCLATURE: TOW TUBE KIT, LAV-AT				
PACKAGE PERTAINS TO: MILES 2000				
PACKAGE CONTENTS				
QUANTITY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
2	TUBE ASSY, TOW, DISMOUNTED	147054	147054-1	
1	TRANSIT CASE, TOW, VEHICLE	147397	147397-2	
AR	OPERATOR'S MANUAL		TD-9-6920-703	

See Figures 1-4 thru 1-6 located at the end of this table.



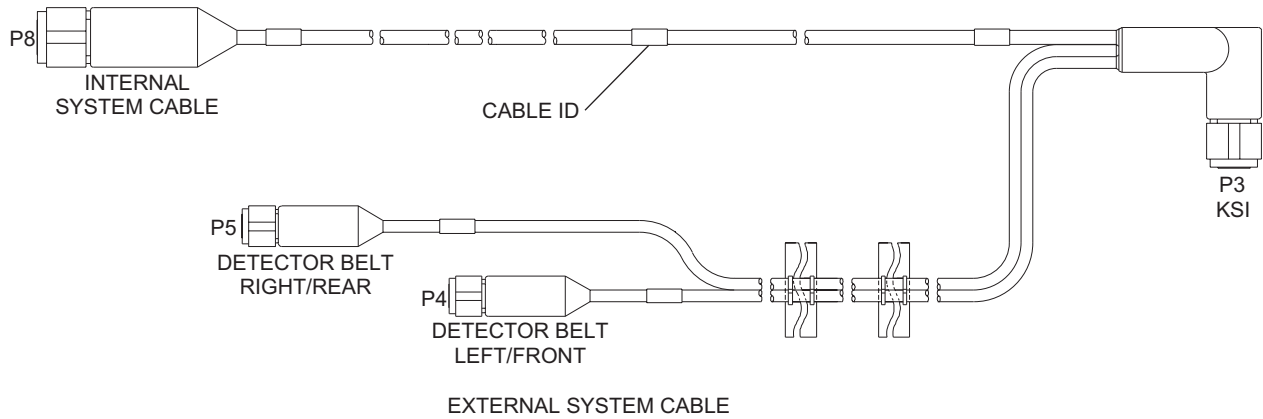
32000033-DT
PN 146701

Figure 1-2. Transit Case.

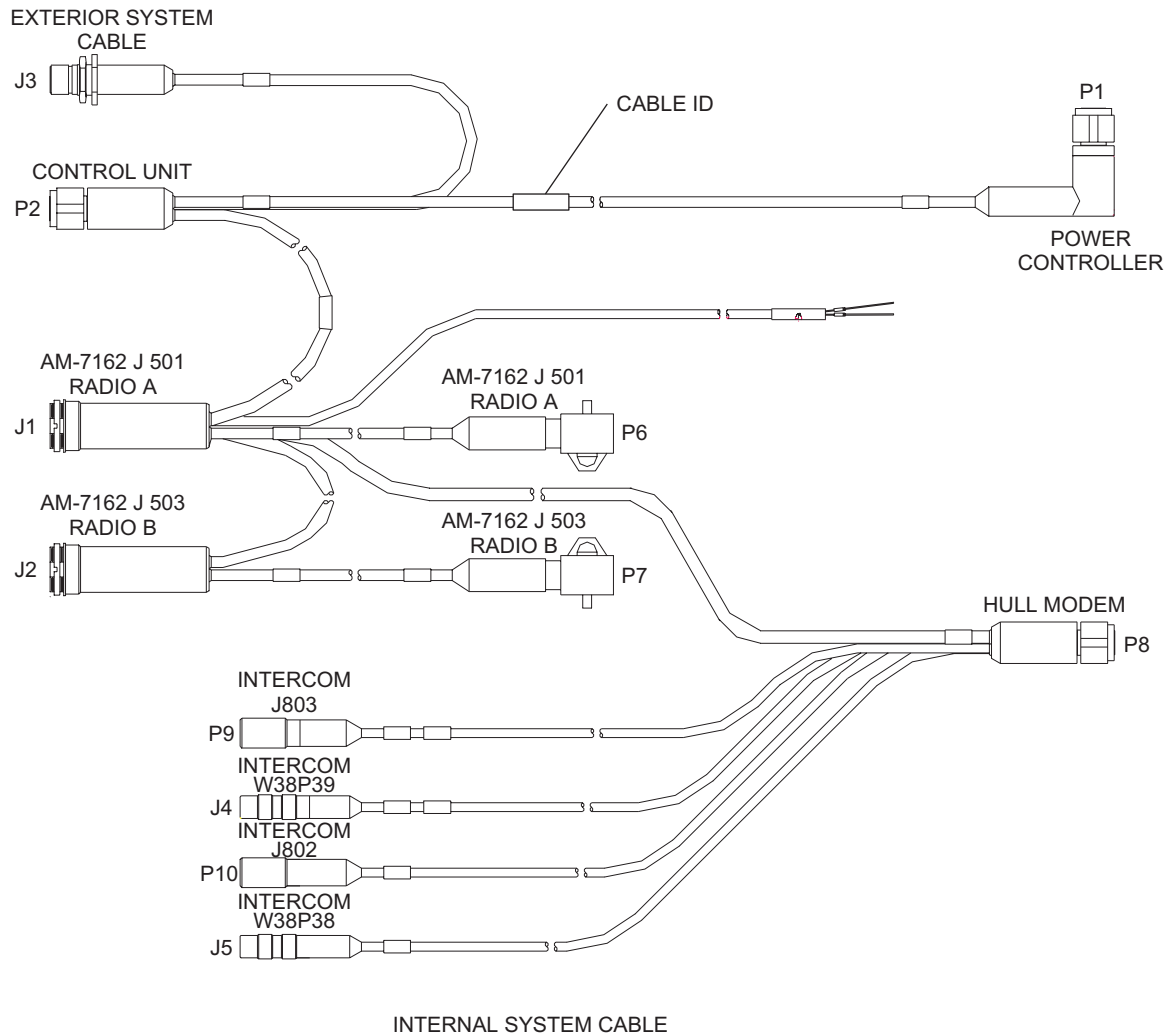


32100073-DT/3

Figure 1-3. System Components (Sheet 1 of 3).

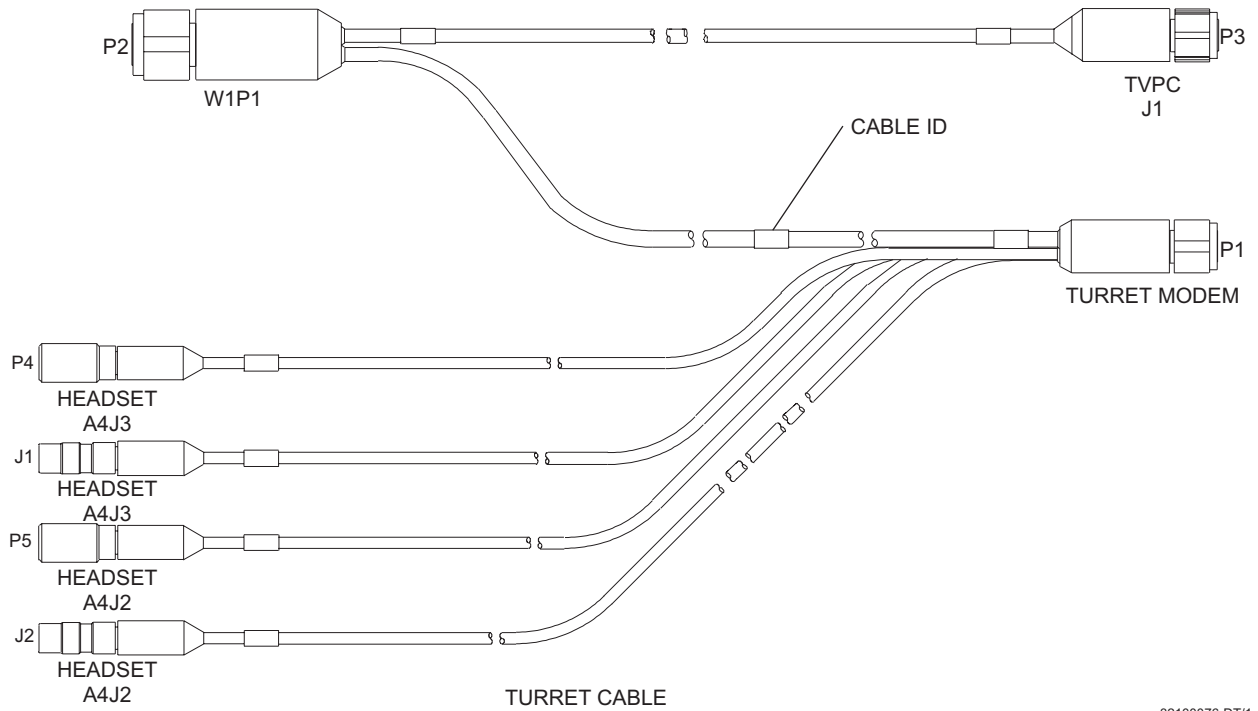


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146705

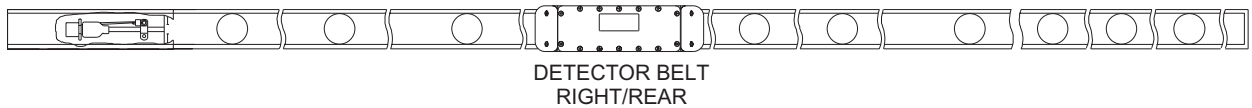


32100079-DT/1
146704

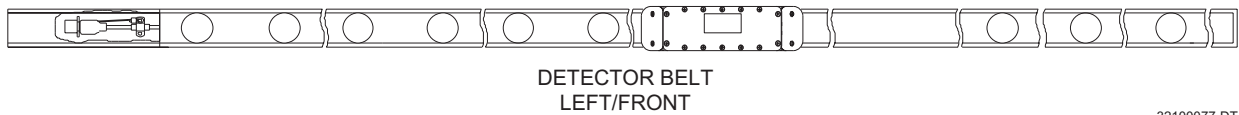
Figure 1-3. System Components (Sheet 2 of 3).



32100076-DT/1
146706

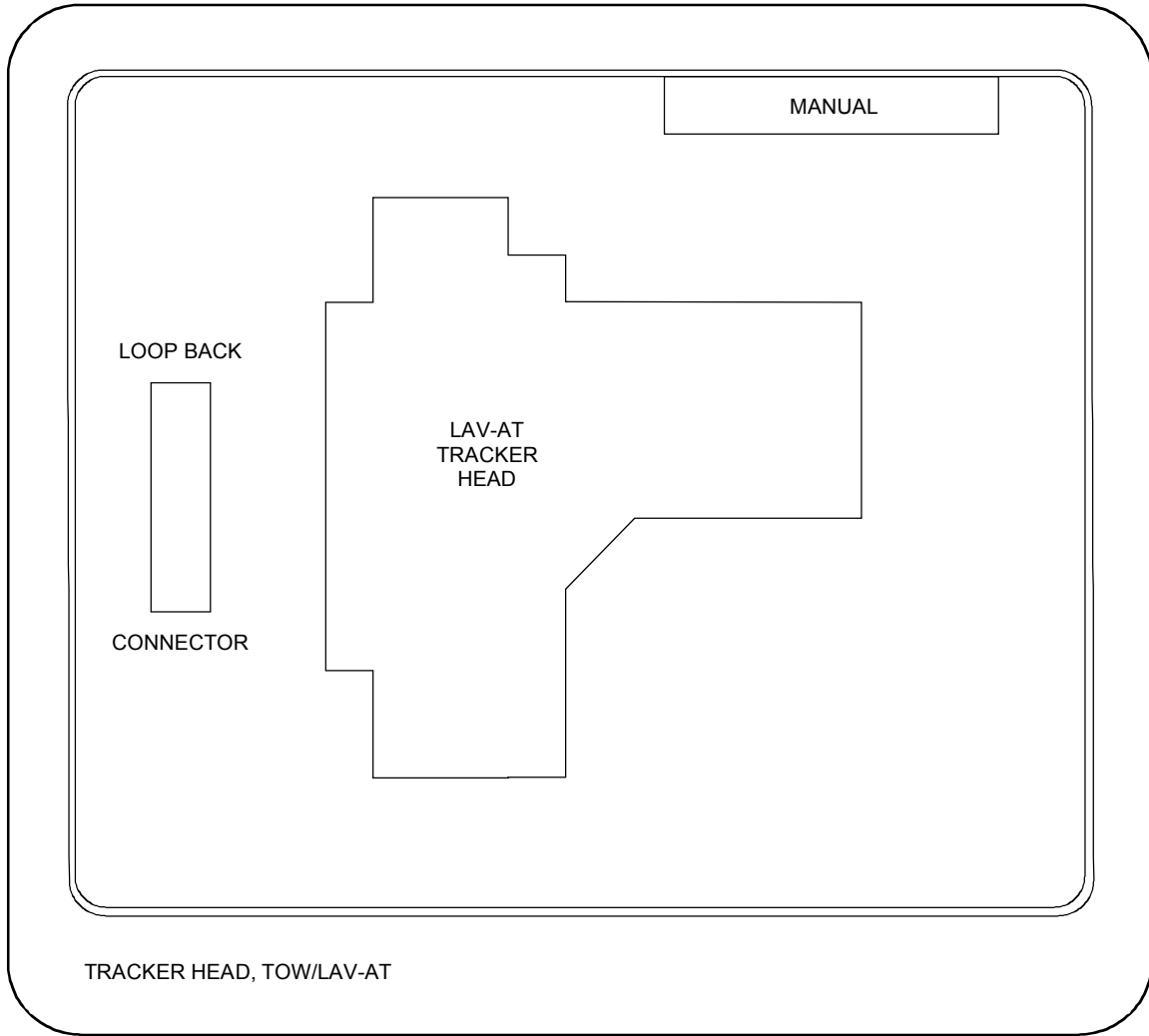


32100078-DT



32100077-DT

Figure 1-3. System Components (Sheet 3 of 3).



32000021-DT
PN 147062

Figure 1-4. Tracker Head, TOW/LAV-AT Transit Case.

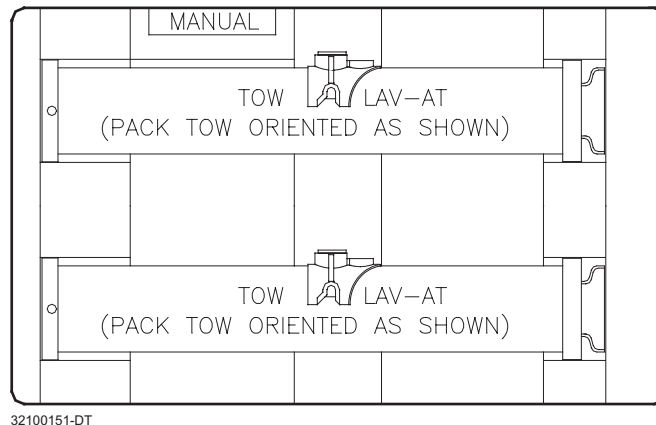
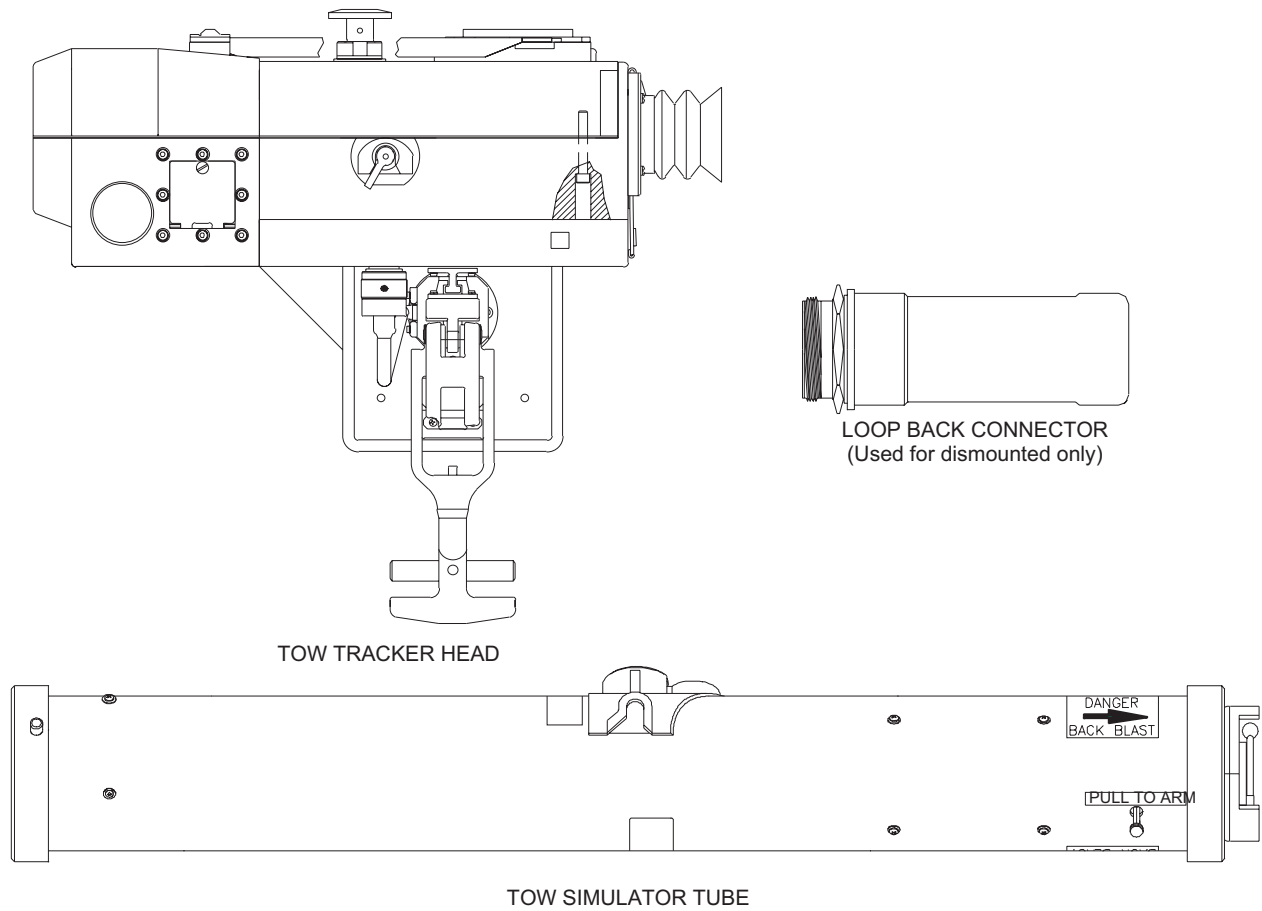


Figure 1-5. TOW Tube, TOW/LAV-AT Transit Case.



32100024-DT/1

Figure 1-6. TOW System Components.

CHAPTER 2 OPERATING INSTRUCTIONS

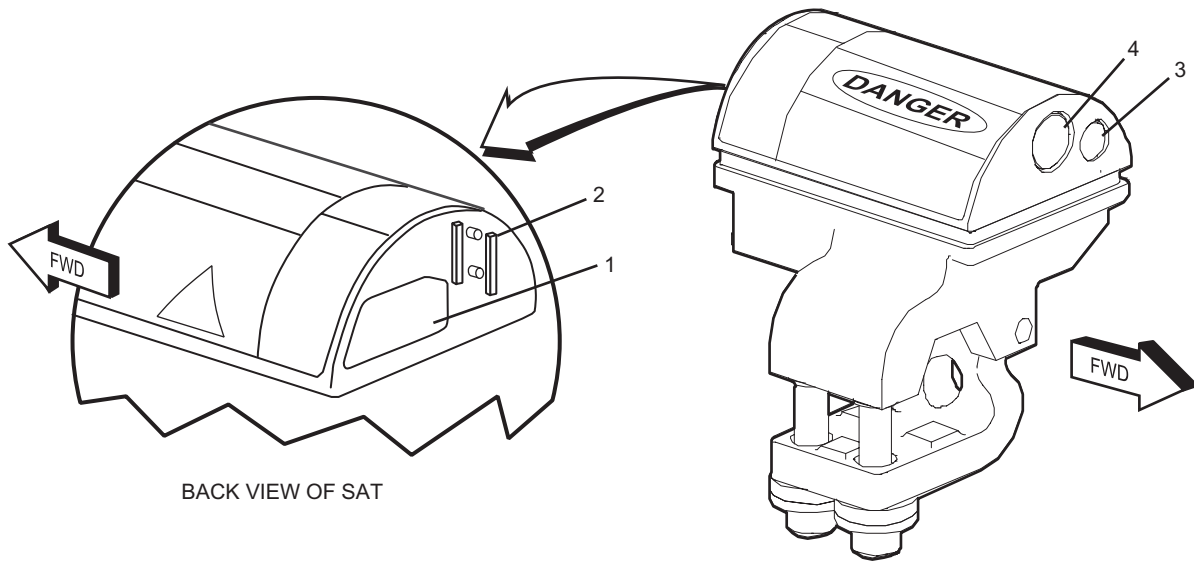
SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2.1 EQUIPMENT CONTROLS AND INDICATORS.

The following figures, as listed in Table 2-1, illustrate and describe the MILES 2000 LAV operating controls and indicators.

Table 2-1. Controls and Indicators Reference.

ITEM	FIGURE NO.
Small Arms Transmitter (SAT)	2-1
Detector Belts	2-2
Kill Status Indicator (KSI)	2-3
TOW Tracker Head (PN 147080-1)	2-4
TOW Tracker Head (PN 147080-3)	2-5
TOW Simulator Tube	2-6
Control Unit (CU)	2-7
Power Controller	2-8
Modem	2-9

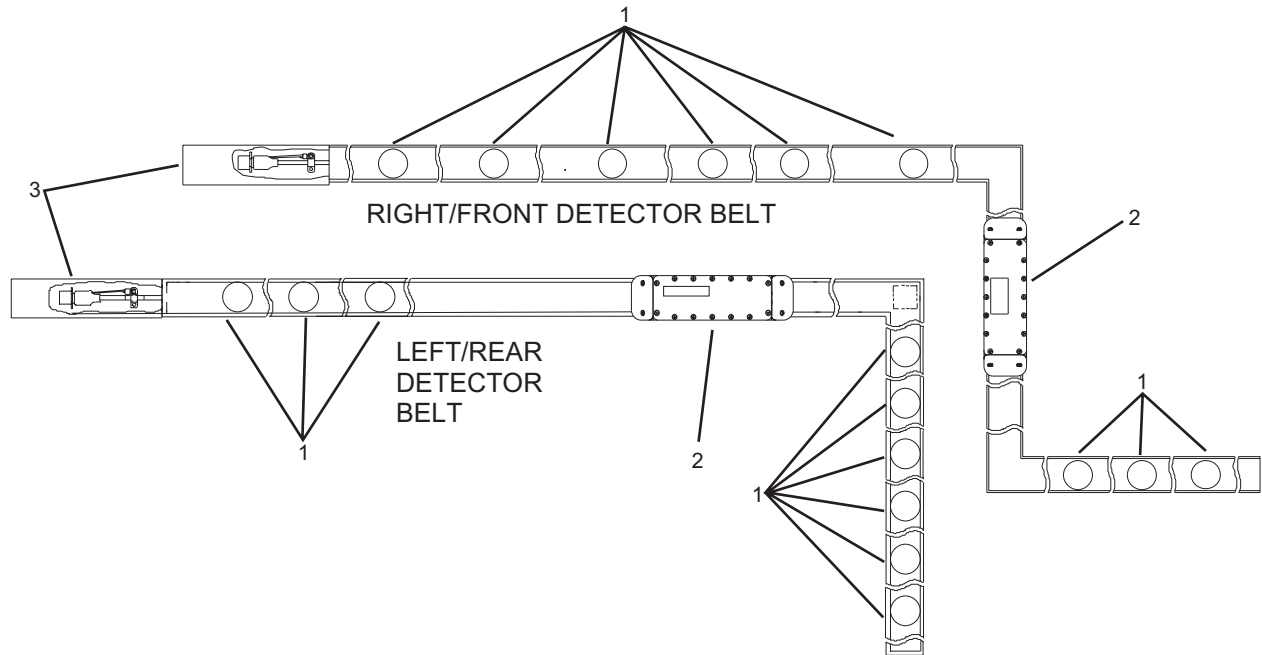


32100058-DT/1

M240G SAT ASSEMBLY

Figure 2-1. Small Arms Transmitter (SAT).

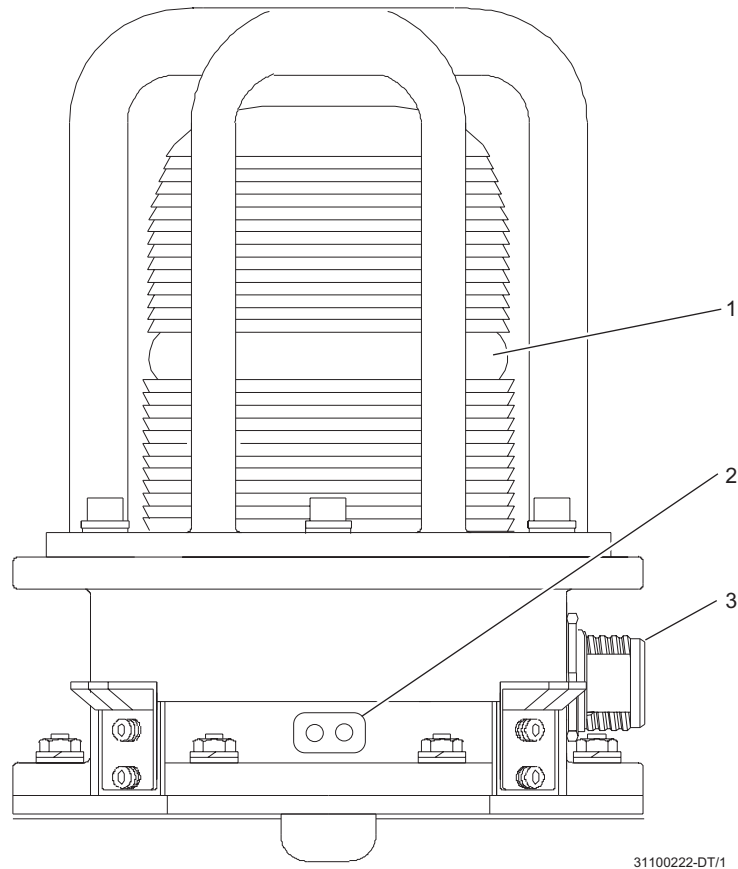
1. **FIRING INDICATOR AND IR TRANSMITTER/RECEIVER PORT.** Firing indicator illuminates when the SAT is fired as a visual aide to the soldier/marine. IR port provides a link between the weapon and the manworn.
2. **ALIGNMENT SHAFTS.** Used to adjust the laser alignment with the Automatic Small Arms Alignment Fixture (ASAAF).
3. **BLANK SENSOR WINDOW.** Allows light flash from blank firing of the weapon to be sensed so that the SAT laser will be transmitted.
4. **LASER OPTICAL WINDOW.** Window through which the laser beam is transmitted.



32100009-DT/2

Figure 2-2. Detector Belts.

1. DETECTORS. Detect laser transmissions that are being fired at the vehicle.
2. AMPLIFIER. Amplifies coded laser signals that simulate incoming fire, and forwards them on to the KSI.
3. CONNECTOR. System Cable connector.



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Figure 2-3. Kill Status Indicator (KSI).

1. **VISUAL STROBE.** Provides a 360E azimuth and 60E elevation optical output when a vehicle is hit (housed in an amber dome).
2. **OPTICAL PORT.** Bidirectional IR communication link used by CD/TDTD (Controller Gun) for uploading and downloading data.
3. **CONNECTOR.** System Cable connection.

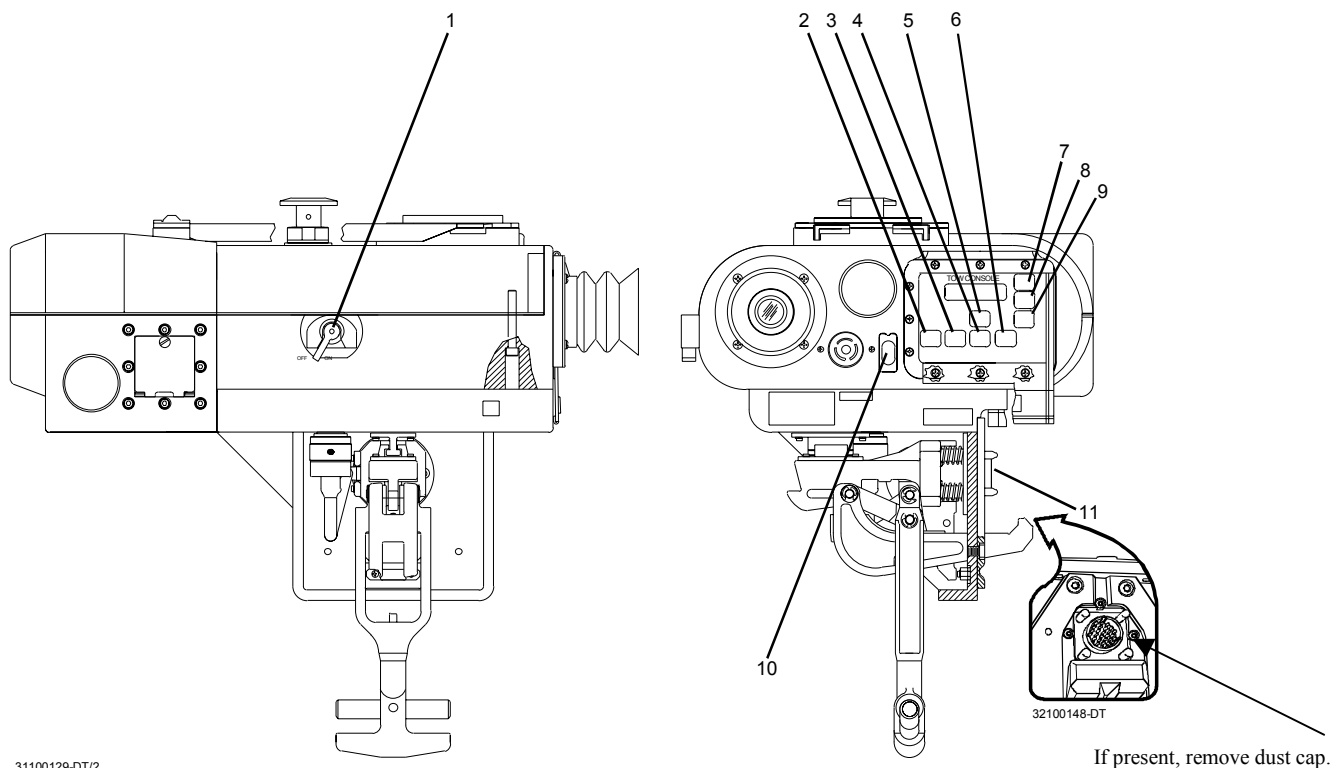


Figure 2-4. TOW Tracker Head (PN 147080-1).

1. RETICLE SWITCH. Turns the crosshairs on the spotting scope ON/OFF.
2. BIT/CTRL/FCTN PUSH BUTTON. BIT when pressed runs self-test. Control Function allows the user to view host platform, vehicle simulated information, and WESS selections.
3. USER INFO/ENTER PUSH BUTTON. This allows the user to access the control mode, range mode, and WESS selection menus.
4. EVENTS PUSH BUTTON. The user may press this push button to access the 16 most recent events of the current exercise.
5. RELOAD. Allows the system to load the selected remaining ammunition shown in the display window.
6. CTRS PUSH BUTTON. Push button allows the user to control the screen contrast.
7. SCROLL UP PUSH BUTTON. Scrolls display up when pressed.
8. SCROLL DOWN PUSH BUTTON. Scrolls display down when pressed.
9. RANGE PUSH BUTTON. Push button allows the user to select different ranges.
10. OPTICAL PORT. Bidirectional IR communication link used by CD/TDTD (Controller Gun) for uploading and downloading data.
11. CONNECTOR. System Cable connection.

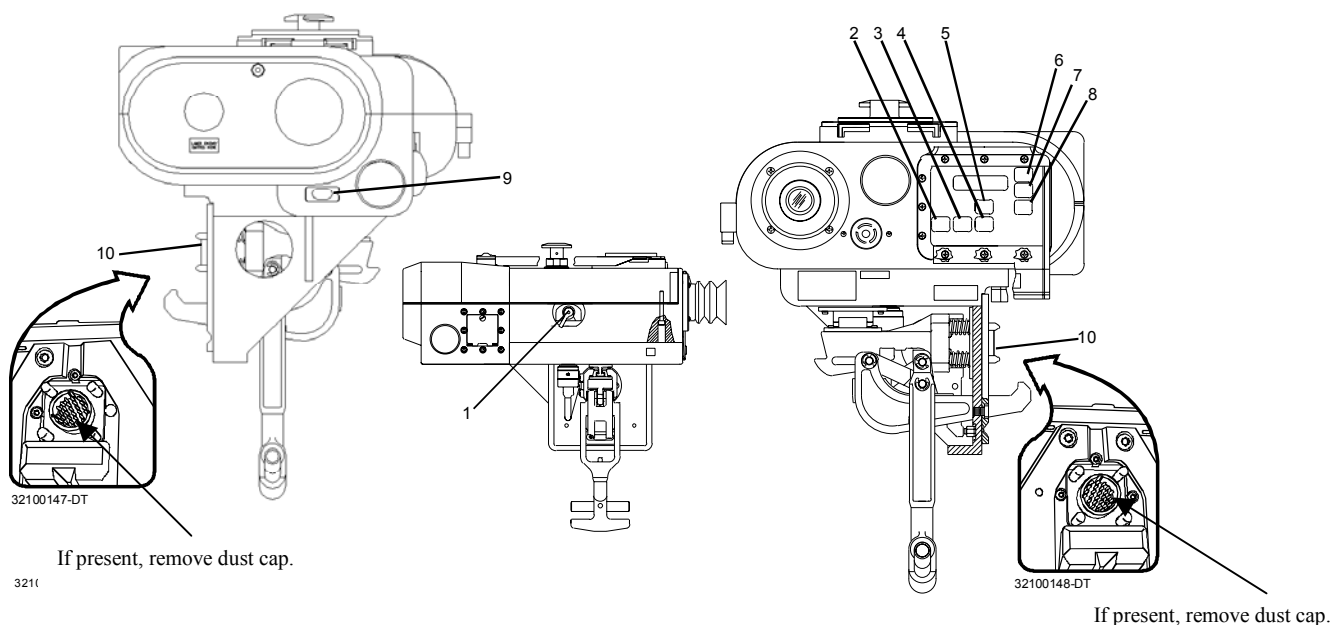


Figure 2-5. TOW Tracker Head (PN 147080-3).

1. RETICLE SWITCH. Turns the crosshairs on the sight ON/OFF.
2. BIT/CTRL/FCTN PUSH BUTTON. BIT when pressed runs self-test. Control Function allows the user to view host platform, vehicle simulated information, and WESS selections.
3. USER INFO/ENTER PUSH BUTTON. This allows the user to access the control mode, range mode, and WESS selection menus.
4. EVENTS PUSH BUTTON. The user may press this push button to access the 16 most recent events of the current exercise.
5. RELOAD. Allows the system to load the selected remaining ammunition shown in the display window.
6. SCROLL UP PUSH BUTTON. Scrolls display up when pressed.
7. SCROLL DOWN PUSH BUTTON. Scrolls display down when pressed.
8. RANGE PUSH BUTTON. Push button allows the user to select different ranges.
9. OPTICAL PORT. Bidirectional IR communication link used by CD/TDTD (Controller Gun) for uploading and downloading data.
10. CONNECTOR. System Cable connection.

1. BREECH LOCK LEVER. When open, allows the soldier to insert an ATWESS cartridge.
2. ARMING PLUNGER. (Not shown.) Arms the TOW after the ATWESS cartridge has been loaded.
3. UMBILICAL CONNECTOR. Connects to the Daysight Tracker routing control signals to the Simulator Tube from the TOW Tracker Head.

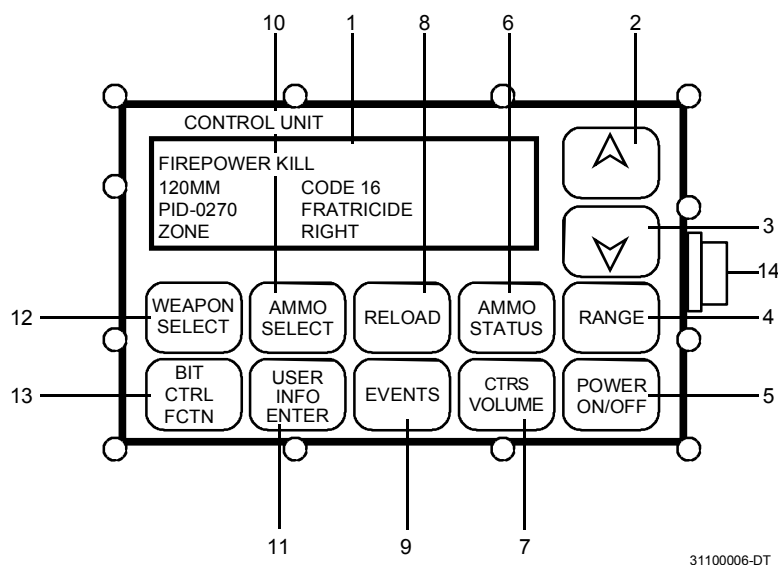


Figure 2-7. Control Unit (CU).

1. DISPLAY WINDOW. Displays events and system messages. (Example display shown.)
2. SCROLL UP PUSH BUTTON. Scrolls display up when pressed, and also moves the cursor.
3. SCROLL DOWN PUSH BUTTON. Scrolls display down when pressed, and also moves the cursor.
4. RANGE PUSH BUTTON. Allows the operator the option to input his estimate of target range.
5. POWER ON/OFF PUSH BUTTON. Enables/disables the MILES 2000 System.
6. AMMO STATUS PUSH BUTTON. Displays number of rounds remaining for selected weapon.
7. CTRS/VOLUME PUSH BUTTON. CTRS allows user to adjust illumination of display. VOLUME allows user to adjust audio level to the vehicle headset.
8. RELOAD PUSH BUTTON. Causes the system to load any available selected remaining ammunition shown in the display window.
9. EVENTS PUSH BUTTON. Allows the operator to review the 16 most recent events on the display window.
10. AMMO SELECT PUSH BUTTON. Allows the operator to view the different ammunition quantities and types available for a main gun or TOW.
11. USER INFO/ENTER PUSH BUTTON. USER INFO Disable allows operator the ability to check his PID and vehicle type, override the communications Disable function under Communications/ Catastrophic Kill conditions in an emergency. ENTER allows controller to enter commands selected in Control Mode.
12. WEAPON SELECT PUSH BUTTON. Allows the operator the option to select the desired weapon to be used.
13. BIT/CTRL FCTN PUSH BUTTON. BIT executes a system BIT with the results shown in the display window. CTRL FCTN allows controller to select vehicle platform type, blank or dryfire, coax activation, and FlashWESS or ATWESS activation, etc.
14. CONNECTOR. System Cable connection.

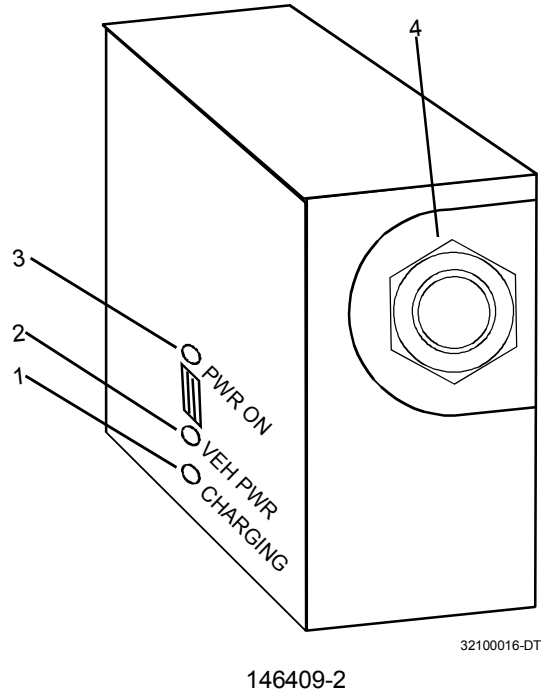
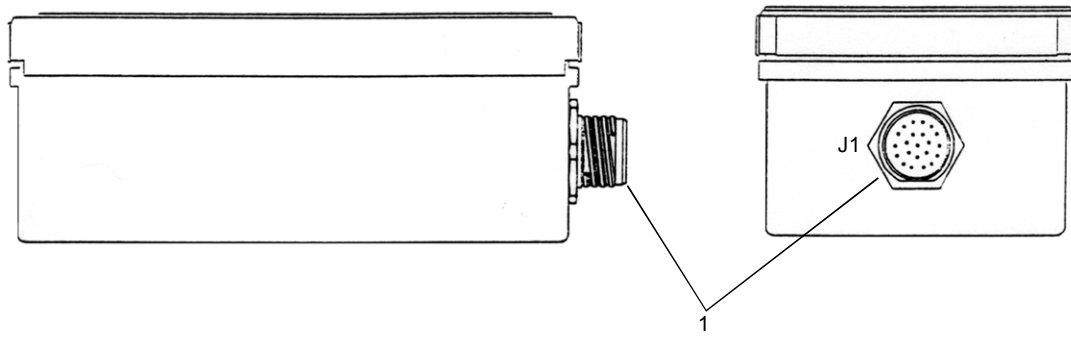


Figure 2-8. Power Controller.

1. CHARGING INDICATOR (146409-2). Illuminates when battery voltage drops below 27.5 Vdc, and battery is charging.
2. VEHICLE POWER PRESENT INDICATOR. LED blinks continuously when vehicle power is at the CVS system, and the internal batteries are being trickle charged.
3. 10.5 VDC POWER PRESENT INDICATOR. LED blinks continuously when 10.5 Vdc power is ON.
4. CONNECTOR. System Cable connection.



32000001-DT/1

Figure 2-9. Modem.

1. CONNECTOR. Turret System cable connection.

SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Preventive Maintenance Checks and Services (PMCS) will ensure that the MILES 2000 equipment will be ready for operation and perform satisfactorily throughout its mission. Preventive maintenance checks consist of performing a systematic inspection to discover defects before they result in operational failure of the equipment. Defects or malfunctions discovered by the crew during use of the MILES 2000 equipment, or as a result of performing maintenance checks and services, will be turned in to the issuing authority.

2.2 INTRODUCTION TO PMCS TABLE.

Operator PMCSs are shown in Table 2-2. Tasks to be performed before operation appear in the “B” column under the heading “Interval.” Tasks to be performed during operation are checked in the “D” column. Tasks to be performed after operation are checked in the “A” column. Tasks to be performed weekly are checked in the “W” column, with tasks to be performed monthly checked in the “M” column.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1) wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth. **The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.**

NOTE

Within designated interval, these checks are to be performed in the order listed.

B – Before Operation
D – During Operation
A – After Operation

W - Weekly
M - Monthly

Table 2-2. Operator Preventive Maintenance Checks and Services.

ITEM NO.	ITEM TO BE INSPECTED	INTERVAL					PROCEDURES CHECK FOR AND HAVE REPAIRED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		B	D	A	W	M		
1.	Small Arms Transmitter (SAT)	✓		✓		✓	Inspect for dirty or damaged window. Clean window.	Window broken, cracked, or missing.
2.	Control Unit (CU)	✓		✓		✓	Inspect for cracks in display window and membrane switches.	Display window or membrane switch broken.
		✓	✓				Check for display in display window when powered on.	No display in display window when powered on.
3.	Kill Status Indicator (KSI)	✓		✓		✓	Inspect for cracks in plastic lens (amber dome) of visual strobe.	Amber dome plastic lens cracked.
		✓		✓		✓	Check for optical port damage.	Lens broken, cracked or missing.
4.	Power Controller	✓		✓		✓	Inspect for damaged connector.	Broken connectors. Bent or missing pins.
		✓		✓		✓	Inspect for acid leaks.	Acid is present.
5.	Detector Belts	✓		✓		✓	Wipe all detectors/connectors clean. Inspect harnesses for damage that would prevent normal operation.	Detectors broken or missing. Connector pins dirty, bent or missing. Amplifier broken.
6.	Modem Unit LAV-AT	✓		✓		✓	Inspect connector for damage.	Broken connector. Bent or missing pins.
7.	TOW Simulator Tube LAV-AT	✓		✓		✓	Inspect tube for obvious damage.	Tube is cracked or broken.

		✓		✓		✓	Wipe electrical connector clean and inspect for damage.	Broken connector. Bent or missing pins.
8.	TOW Tracker Head LAV-AT	✓					Inspect for cracks in display window and membrane switches.	Display window or membrane switch cracked or broken.
		✓		✓			Check for display in display window when powered on.	No display in display window when powered on.
		✓		✓		✓	Wipe connector clean and inspect for damage.	Broken connector. Bent or missing pins.

Table 2-2. Operator Preventive Maintenance Checks and Services-Continued.

ITEM NO.	ITEM TO BE INSPECTED	INTERVAL					PROCEDURES CHECK FOR AND HAVE REPAIRED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		B	D	A	W	M		
9.	Cable and Connector Assemblies	✓		✓		✓	Inspect for worn or bare wires.	Broken or bare wires are present.
		✓		✓		✓	Inspect connectors for damage or broken pins.	Broken connectors. Bent or missing pins.

SECTION III. OPERATION UNDER USUAL CONDITIONS

2.3 ASSEMBLY AND PREPARATION FOR USE.

MILES 2000 equipment must be inspected and prepared as described in the following paragraphs prior to use.

NOTE

When applying fastener tape, always apply the “hook” type tape to the holding surface (the surface to which an item will be installed), and the “pile” type tape to the item being installed. For example, when installing the CU in the LAV, you would apply the hook tape to the side wall of the commander’s station, and the loop tape to the CU. The CU pile tape can then be attached to the side wall hook tape, firmly securing the CU.

2.3.1 Fastener Tape.

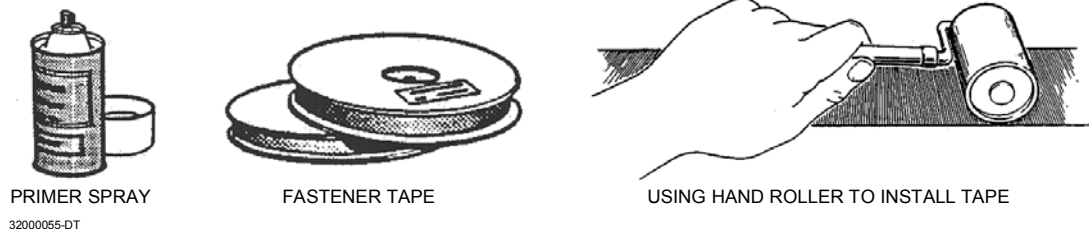
2.3.1.1 Fastener Tape Application and Preparation. Much of the MILES 2000 equipment is mounted with fastener tape. If fastener tape is not affixed to the vehicle already, or if existing tape is worn and/or unserviceable, remove any existing tape and use the following directions to apply/reapply the fastener tape:

- a. Mark the vehicle for primer/fastener tape application along the areas where the belts will be routed. Those areas are described in the applicable paragraphs.
- b. Clean all areas where fastener tape is to be installed with water, a brush, if necessary, and rags. Tape will not adhere to a dirty, wet, or oily surface.

WARNING

Tape primer is toxic and highly flammable. Do not spray near heat, open flame, or sparks. Use primer only in well ventilated areas. Do not permit smoking in the area. Injury to personnel may result.

- c. Spray a heavy coat of tape primer on the cleaned areas along the strip where the fastener tape will be applied. Allow primer to dry thoroughly (follow the directions on the primer can), before applying the fastener tape. (See Figure 2-10.)
- d. Cut tape to the appropriate lengths as you need it for the equipment installation.



NOTE

Not in MILES Kit.

Figure 2-10. Fastener Tape Preparation.

NOTE

The fastener tape has a protective backing. When applying short lengths of tape, remove all the backing before installing the tape. When applying longer lengths, remove the backing gradually as you apply the tape. This will help keep the tape adhesive from sticking to itself or to the wrong surface.

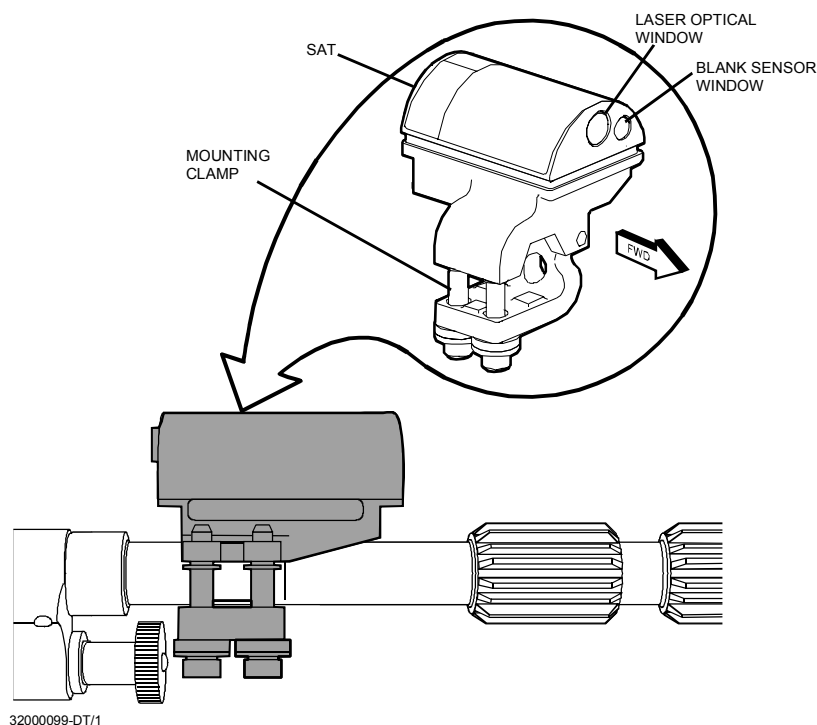
The quadrants of the vehicle-Left/Front, Right/Front, Left/Rear, Right/Rear-are determined from the driver's viewpoint, which would be as facing towards the front of the vehicle. All installation instructions are given from this viewpoint, even though at times the installer may be facing to the rear of the vehicle.

NOTE

MILES equipment installation procedures should be followed as outlined in the technical manual. If the following procedures CANNOT be followed due to cable length or additional vehicle equipment, then place the MILES equipment in the best and safest location.

2.3.2 Installation of MILES 2000 Equipment on LAV-AT.**NOTE**

For the application of primer and fastener tape to MILES equipment, refer to paragraph 2.3.1.1.

2.3.2.1 M240 Small Arms Transmitter (SAT). (See Figure 2-11.)**Figure 2-11. M240 w/SAT.**

- a. Remove the SAT from the transit case. The SAT and clamp assembly are one (1) unit. Make sure the SAT is clean and dry, and not cracked or broken.
- b. Inspect the Blank Sensor Window and the Laser Optical Window, making sure they are not cracked, broken, or missing. Make sure the mounting clamp is operational.
- c. Inspect the IR Transmit/Receive window making sure that it is not cracked, broken, or missing.
- d. Replace and report damaged equipment, as required.
- e. Attach the SAT to the barrel of the M240 machine gun and torque to 60 inch-pounds, using the torque wrench supplied in the ASAAF kit.

CAUTION

Use care when starting capscrews not to cross threads. DO NOT use any tools to tighten capscrews until directed.

- f. Align the SAT using the ASAAF. Refer to TD 23-6920-705-10/TM 6920-10/2, Section III.

2.3.2.2 Detector Belts.

- a. Remove belts from the transit case. Lay out belts to assess the shape and size of the belts, as well as the placement of the system cable connector on each belt.
- b. Wipe all detectors clean.
- c. Inspect connector for dirt and/or damage.
- d. Replace and report damaged equipment, as required.

NOTE

Connectors for the External System Cable will be located at the Left/Rear corner of the vehicle.

- e. Working with the short section, press the Right/Rear belt, starting at the Left/Rear corner, working to the right, centering the three (3) detectors above the doors. (See Figure 2-12.)

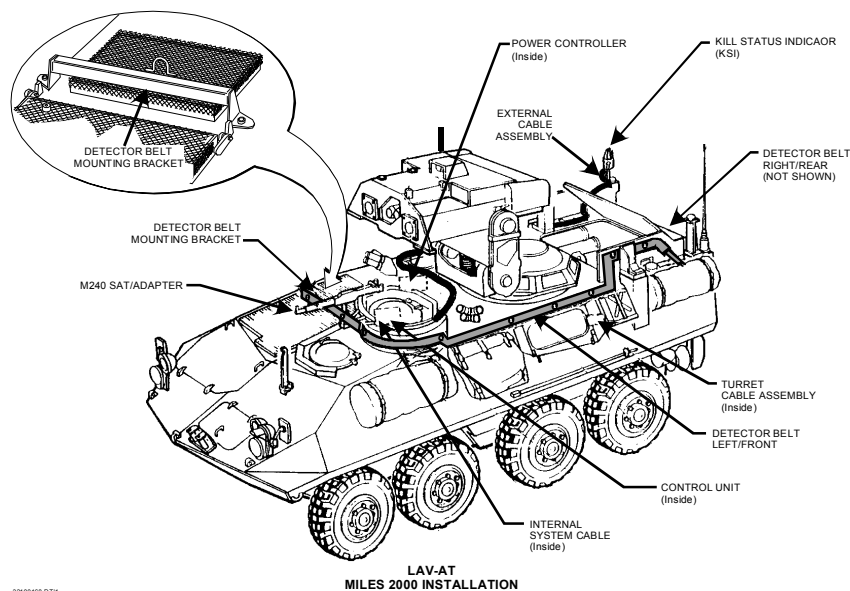


Figure 2-12. LAV-AT.

- f. Place the amplifier on top of the vehicle's hull, then route the cable over to the side. Continue along the right side of the vehicle. This is where the External System Cable connector will be located.

WARNING

Never touch the vehicle exhaust equipment when installing or removing MILES 2000 equipment. The exhaust can be very hot and cause severe burns.

- g. The belt labeled Left/Front requires the use of a detector belt-mounting bracket. This bracket will be installed using the existing bolts between the two engine cover grates to the right of the M240.

- h. Remove the two (2) bolts shown in Figure 2-13, and keep them with you.

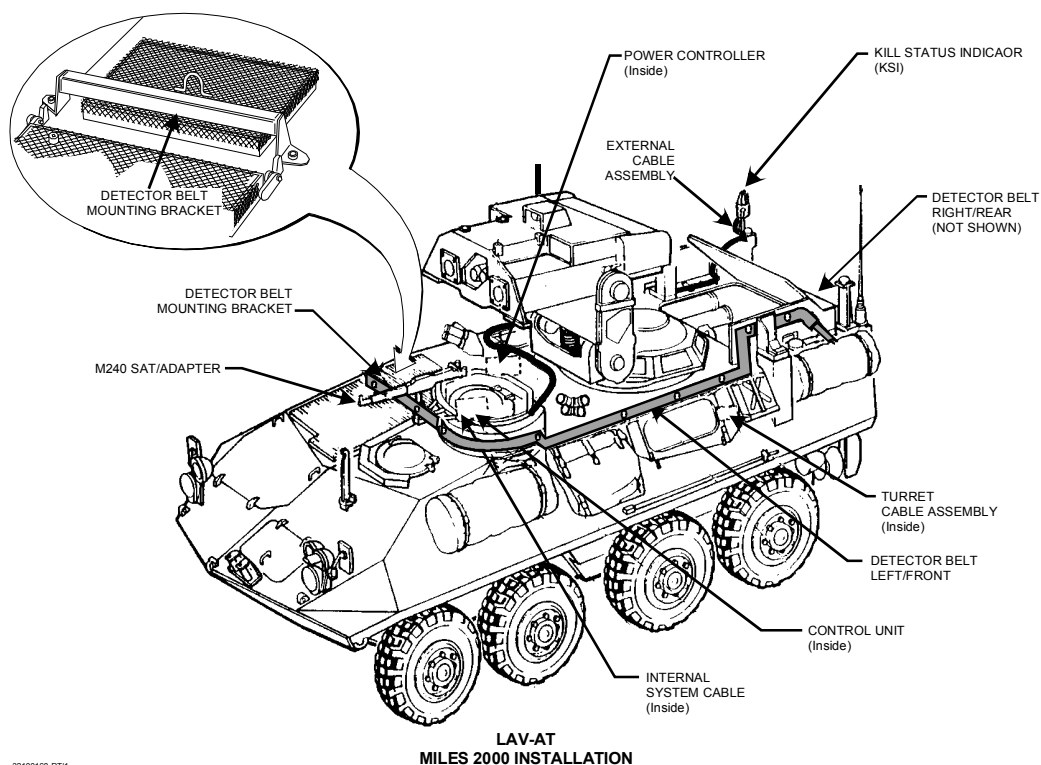


Figure 2-13. LAV-AT.

- i. Remove the detector belt-mounting bracket from the transit case and place it forward of the grill next to the commander's hatch, ensuring the mounting holes of the bracket match up with the mounting holes on the vehicle.
- j. Secure the mounting bracket to the vehicle using the removed bolts.
- k. Working with the short section, press the Left/Front belt, starting at the right side of the mounting bracket, working left to the commander's hatch.
- l. Center one (1) detector on the commander's hatch. Continue along the left side of the vehicle to the Left/Rear corner. This is where the External System Cable will be connected.

CAUTION

Do not connect the MILES 2000 Dismounted TOW to the Missile Guidance System (MGS). Use the Connector Assembly-Loop Back (P/N 147059-1) supplied in the MILES 2000 Dismounted TOW kit. Damage to the MILES 2000 Dismounted TOW kit may occur.

2.3.2.3 Kill Status Indicator (KSI).

- a. Remove the KSI and the mast assembly from the transit case.
- b. Inspect strobe assembly of the KSI for cracks.
- c. Inspect connector for dirt and/or damage.
- d. Replace and report damaged equipment, as required.
- e. Detach the U-bolt clamp from the mast assembly, but keep it with you.
- f. Place the mast assembly over the Right/Rear-lifting eye, and secure the adapter to the lifting eye with the U-bolt clamp. (See Figure 2-14.)

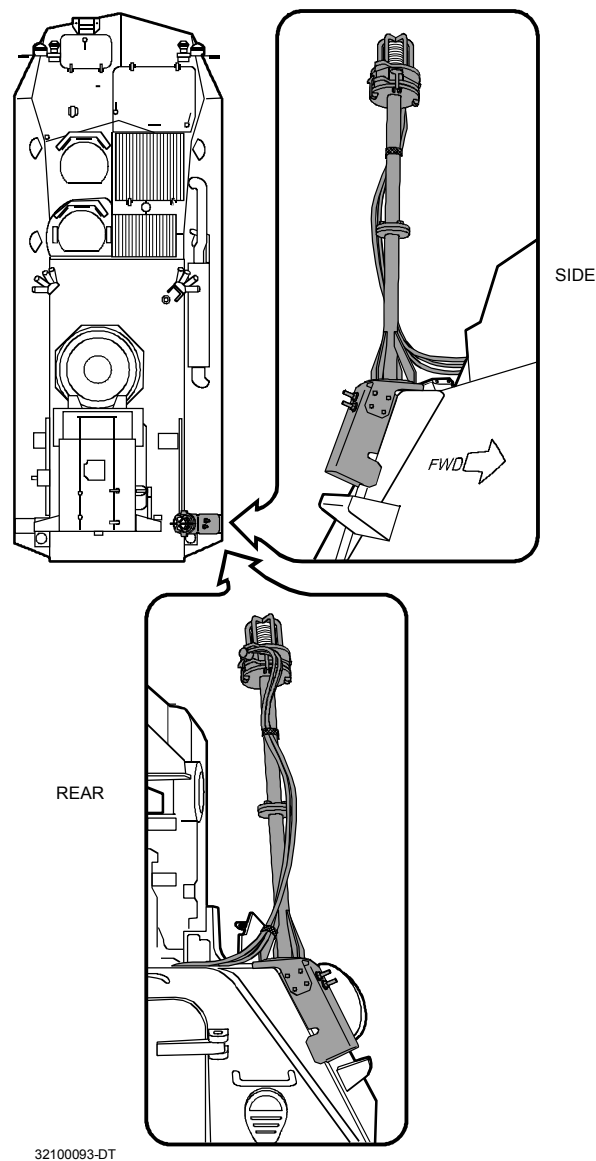


Figure 2-14. KSI Mounting.

- g. Attach the upper portion of mast to the lower mast assembly and secure.
- h. If there is no fastener tape on the bottom of the KSI, apply two large strips of pile fastener tape to the bottom of the KSI (ensuring the center bolt is not obstructed), and two large strips of hook fastener tape to the top of the mast assembly (ensuring the mounting hole is not obstructed). (Refer to paragraph 2.3.1.1 for fastener tape application.)

NOTE

For the following step, make sure the KSI and the adapter are lined up as described before placing them together, as the fastener tape will make it difficult to separate the units to realign them.

- i. Install KSI on mast assembly.
- j. After matching the center bolt with the mounting hole, making sure the four (4) rubber latches on the adapter assembly are in line with the four (4) latching brackets on the KSI. Place the KSI securely on the adapter.
- k. Pull each rubber latch up and fasten it to its latching bracket.

2.3.2.4 TOW Tracker Head (See Figure 2-15.)

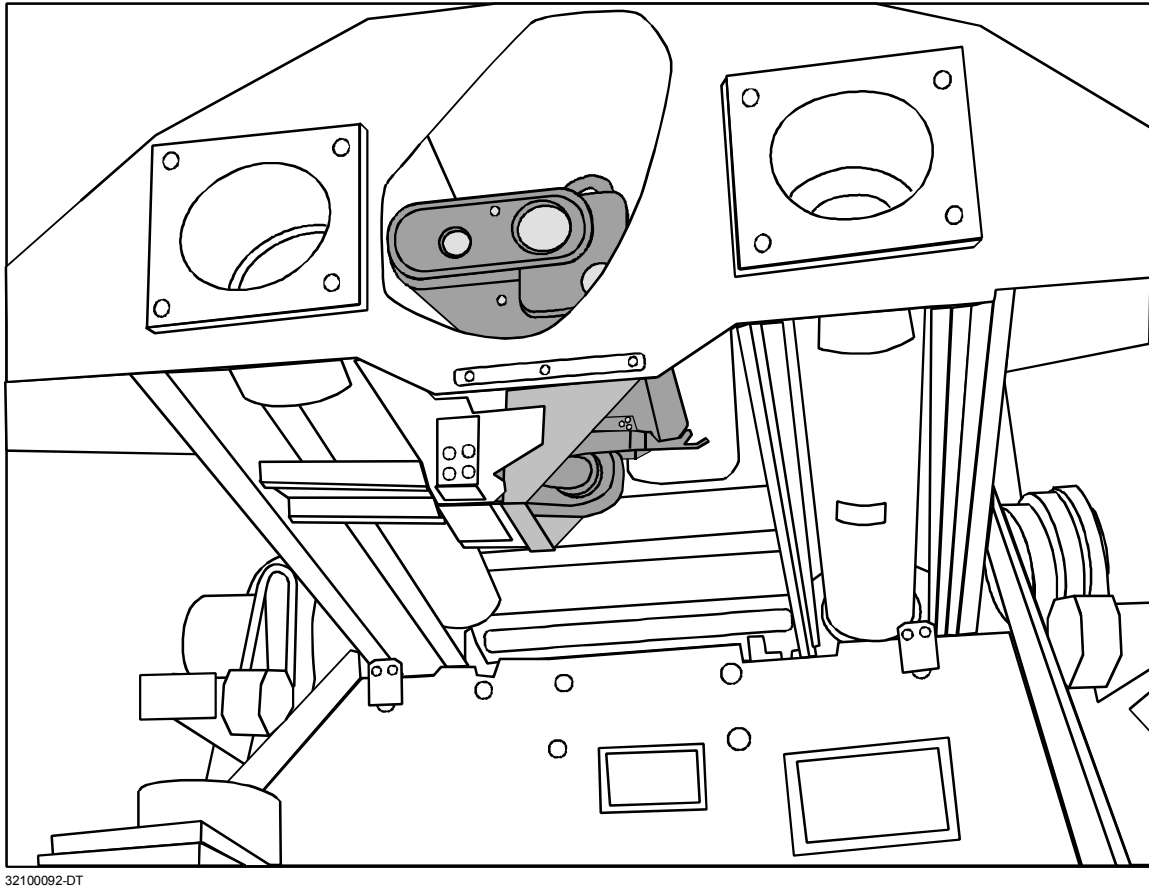


Figure 2-15. TOW Tracker Head.

- a. Remove the TOW Tracker Head from the transit case, and inspect the unit for damage.
- b. If present, remove dust cap.
- c. Inspect connector for dirt and/or damage from connector.
- d. Replace and report damaged equipment, as required.
- e. Install the Tracker Head as you would the Daysight Tracker.

2.3.2.5 TOW Simulator Tube. (See Figure 2-16.)

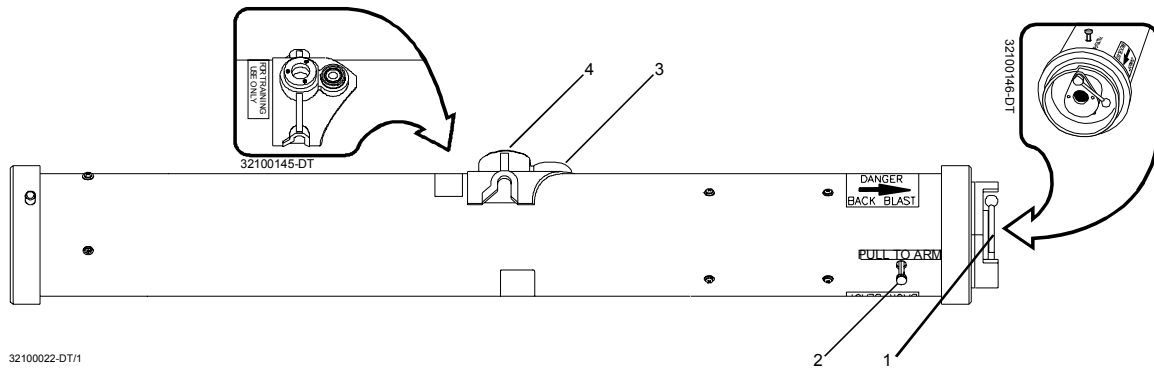


Figure 2-16. TOW Simulator Tube.

- Remove the TOW Simulator Tube from the transit case, and inspect the unit for damage.
- Remove the dust cover from the umbilical connector.
- Inspect connector for dirt and/or damage.
- Replace and report damaged equipment, as required.
- Install the Simulator Tube as you would the encased missile. (See Figure 2-17.)
- If the display for the TOW does not indicate a missile is present, reseal the missile as firmly as possible.

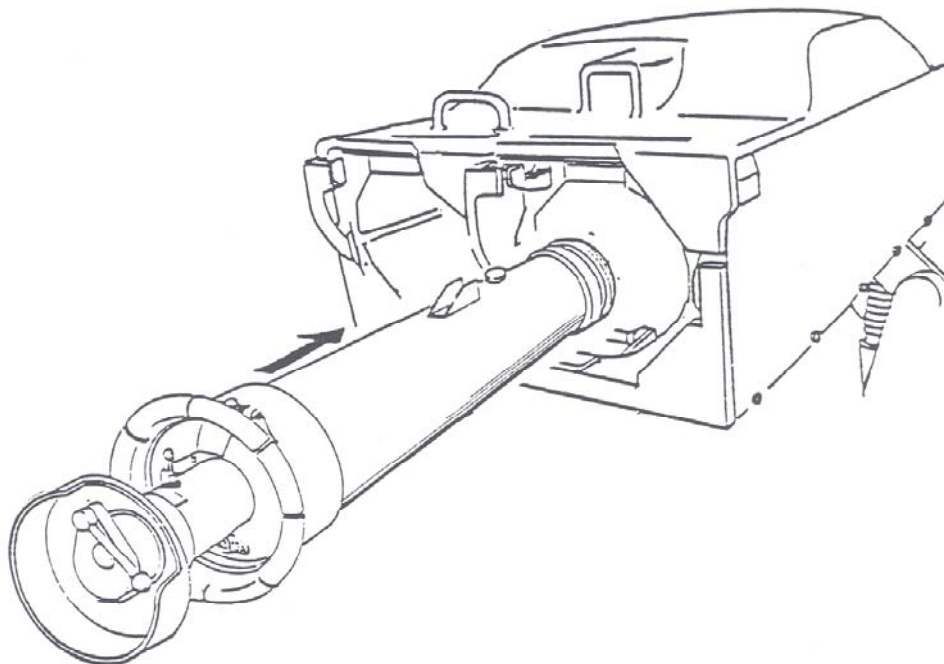


Figure 2-17. TOW Tube Loading.

2.3.2.6 External System Cable. (See Figure 2-18.)

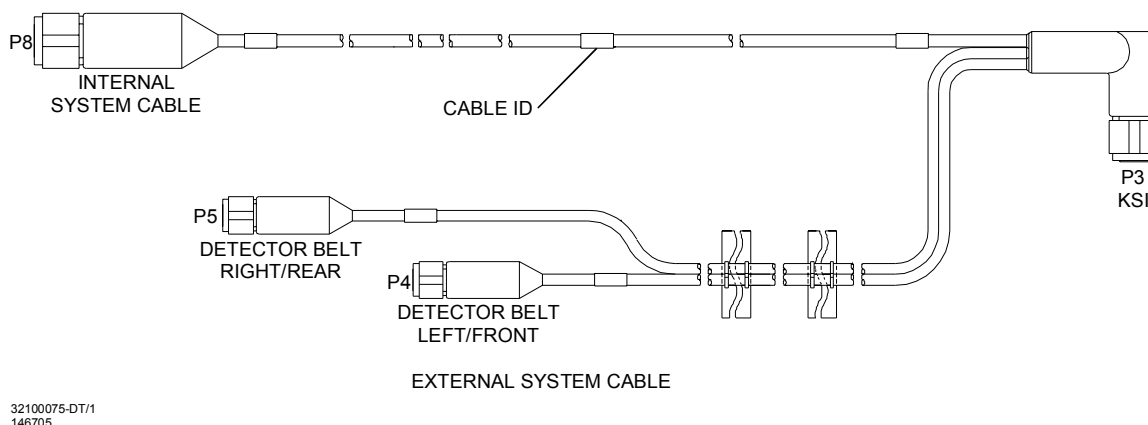


Figure 2-18. External System Cable.

WARNING

To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.

- Remove the cable from the transit case. Inspect the entire length of the cable, making sure there are no bare wires exposed, and that the cable has not been damaged in any way.
- Inspect connectors for dirt and/damage.
- Replace and report damaged equipment, as required.

NOTE

Route the cables and connect them to the individual units, using fastener tape patches or tie-wraps at intervals to secure the cables safely out of the way.

Letter/number designators are shown in parenthesis. For example: (P3) or (J1). The designators have been added to clarify connector identifications. Each system cable segment is labeled with its unique designator, as well as with the name of the unit to which the segment should be connected.

Cable segments are labeled with “P” (plug) and “J” (jack) designators as shown in the following example: “P1/J2,” where P1 indicates that the connector of that cable segment is plug #1, and J2 indicates the routing destination, jack #2, of the equipment/cable to which the cable segment is being routed. The installation instructions of this manual identify the equipment/cable to which each cable segment is to be routed.

- d. Lay out the cable on top of the vehicle. Stretch it out and look for the segments labeled KSI, Right/Front, and Left/Rear. Group these segments together. (See Figure 2-19.)

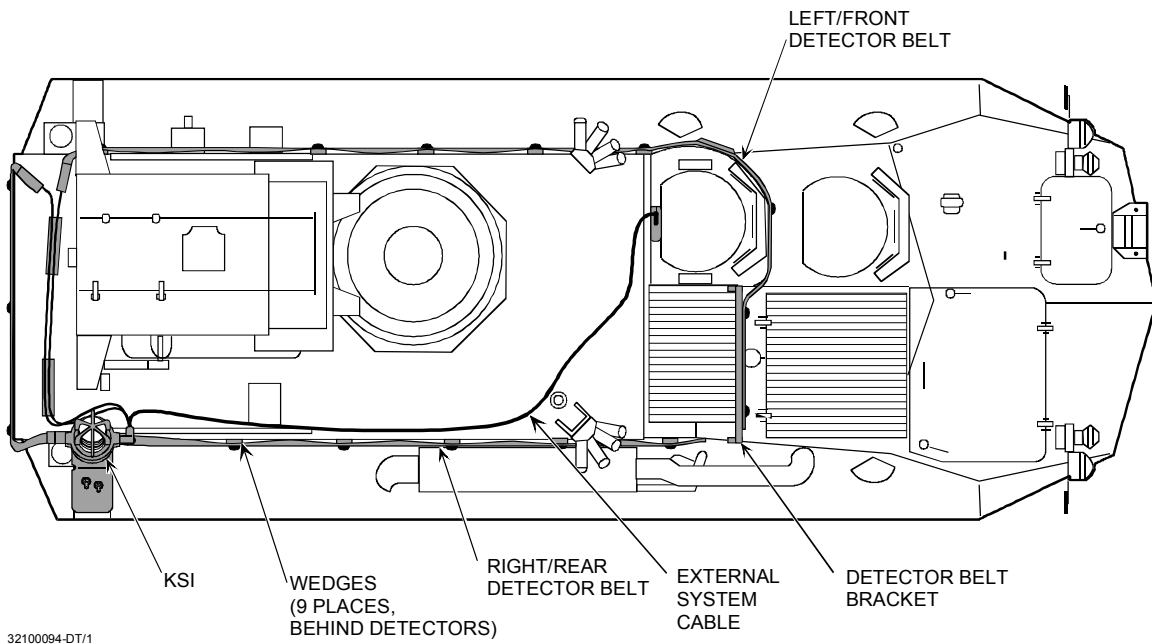


Figure 2-19. Cable Routing.

- e. Slide the remaining segment (P8-brown sleeve) into the periscope vision block grommet, and route it through the 6 o'clock vision block.
- f. Once the cable segment is inside, install the periscope vision block grommet by pushing firmly, and ensuring a snug fit.
- g. Route segment (P3-green sleeve) to the KSI, and connect (P3) to (J1) of the KSI.
- h. Route the detector belt cables to the Left/Rear corner of the vehicle. Attach the connector labeled Right/Rear (P5-gray sleeve) to the Right/Rear detector belt connector (J1), and the cable labeled Left/Front (P4-white sleeve) to the Left/Front detector belt connector (J1).
- i. Secure all cables out of the way with fastener tape patches or tie-wraps.

2.3.2.7 Control Unit (CU).

- a. Remove the CU from the transit case, and inspect for cracks or broken display window and membrane switch damage.
- b. Inspect connector for dirt and/or damage.
- c. Replace and report damaged equipment, as required.
- d. On the bottom and back of the box, there should be two (2) strips of fastener tape. (Refer to paragraph 2.3.1.1 for fastener tape application.)
- e. Attach fastener tape to the right wall to the of the commander's station.
- f. Mount the CU on the wall and ensure it is firmly seated. (See Figure 2-20.)

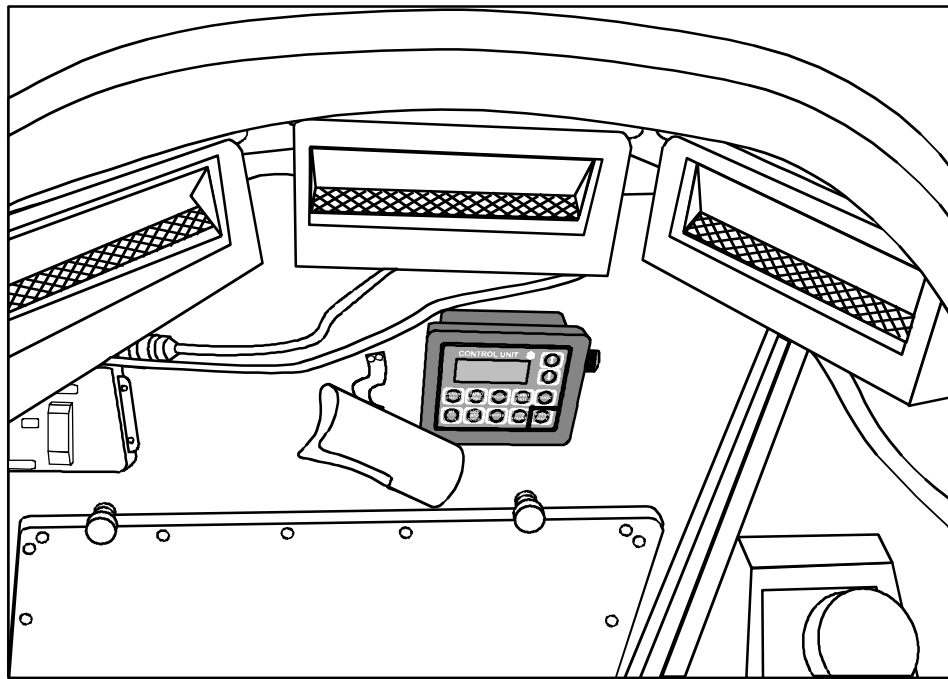
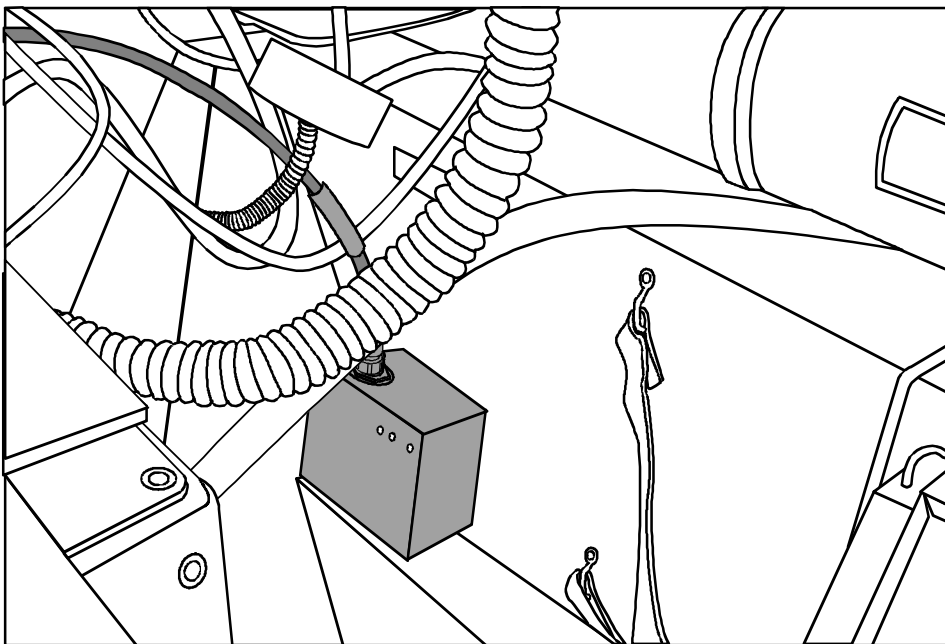


Figure 2-20. Control Unit (CU).

2.3.2.8 Power Controller.

- a. Remove the Power Controller from the transit case, and inspect for damage.
- b. Inspect connector for dirt and/or damage.
- c. Replace and report damaged equipment, as required.
- d. On the bottom of the box, there should be two (2) strips of fastener tape. (Refer to paragraph 2.3.1.1 for fastener tape application.)
- e. Attach fastener tape to the lower shelf behind the dismantled TOW tripod storage area.
- f. Mount the Power Controller to the vehicle, and ensure that it is firmly seated. (See Figure 2-21.)



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Figure 2-21. Power Controller.

2.3.2.9 Modem Units. There will be two (2) modem units installed on the LAV-AT. One (1) will be installed in the turret of the vehicle (the turret modem); and one (1) will be installed in the hull of the vehicle (the hull modem).

- a. Remove the modems from the transit case, and inspect each modem for damage.
- b. Inspect connectors for dirt and/or damage.
- c. Replace and report damaged equipment, as required.
- d. Attach fastener tape to the area under the gunner's seat. (Refer to paragraph 2.3.1.1 for fastener tape application.)
- e. Attach fastener tape to the bottom and back of the turret modem, if there is none.
- f. Mount the turret modem in place of the Missile Guidance System, and ensure that it is firmly seated. (See Figure 2-22.)

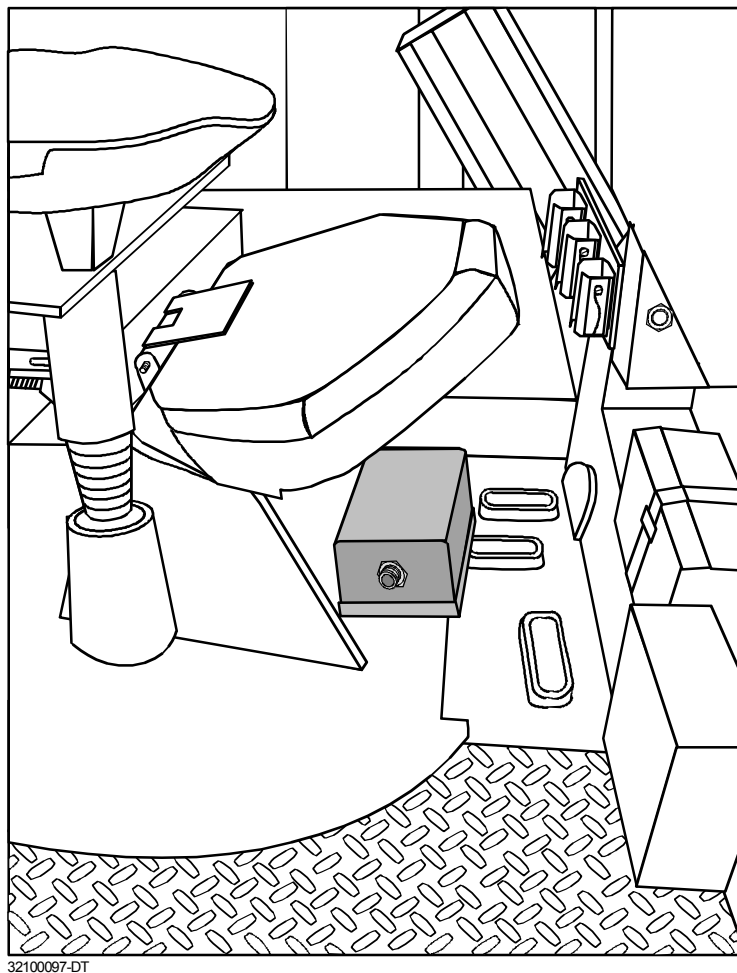
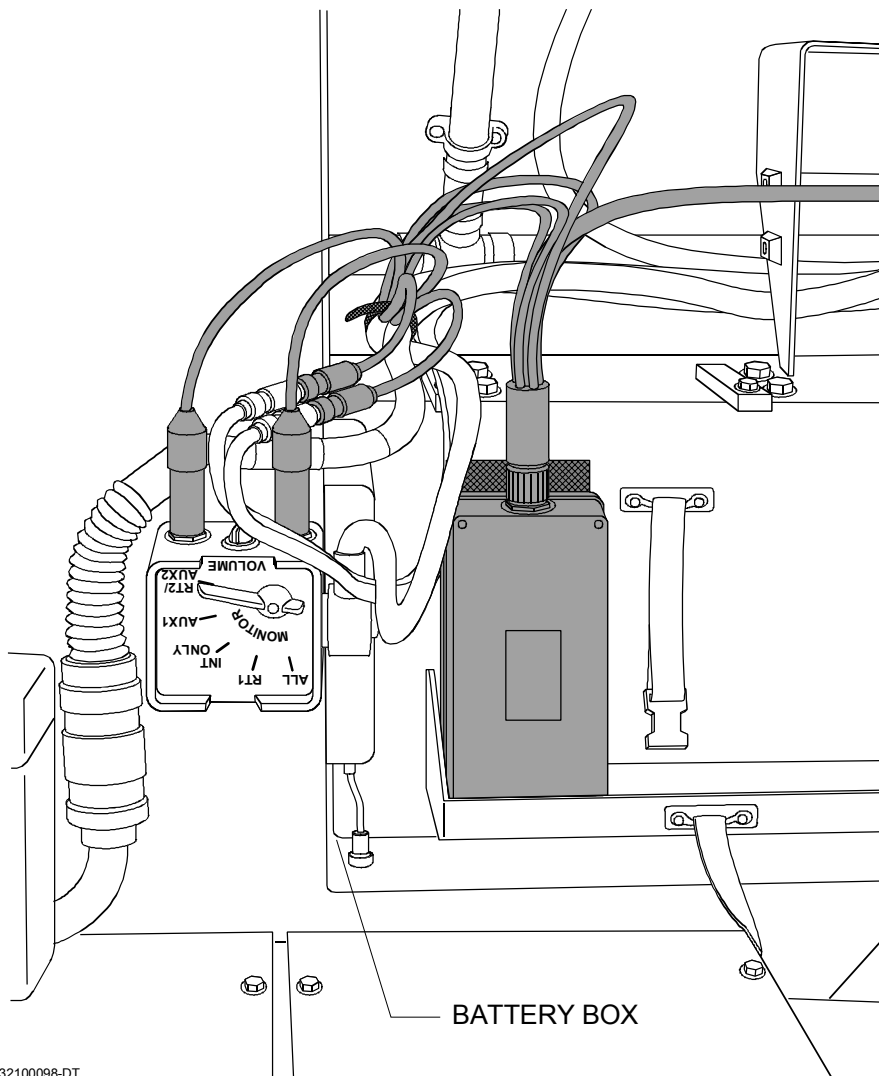


Figure 2-22. Turret Modem.

- g. Attach fastener tape to the left wall shelf near the vehicle's fuel tank.
- h. Attach fastener tape on the hull modem, if there is none.
- i. Mount the hull modem to the Missile Guidance System battery shelf, and ensure that it is firmly seated. (See Figure 2-23.)

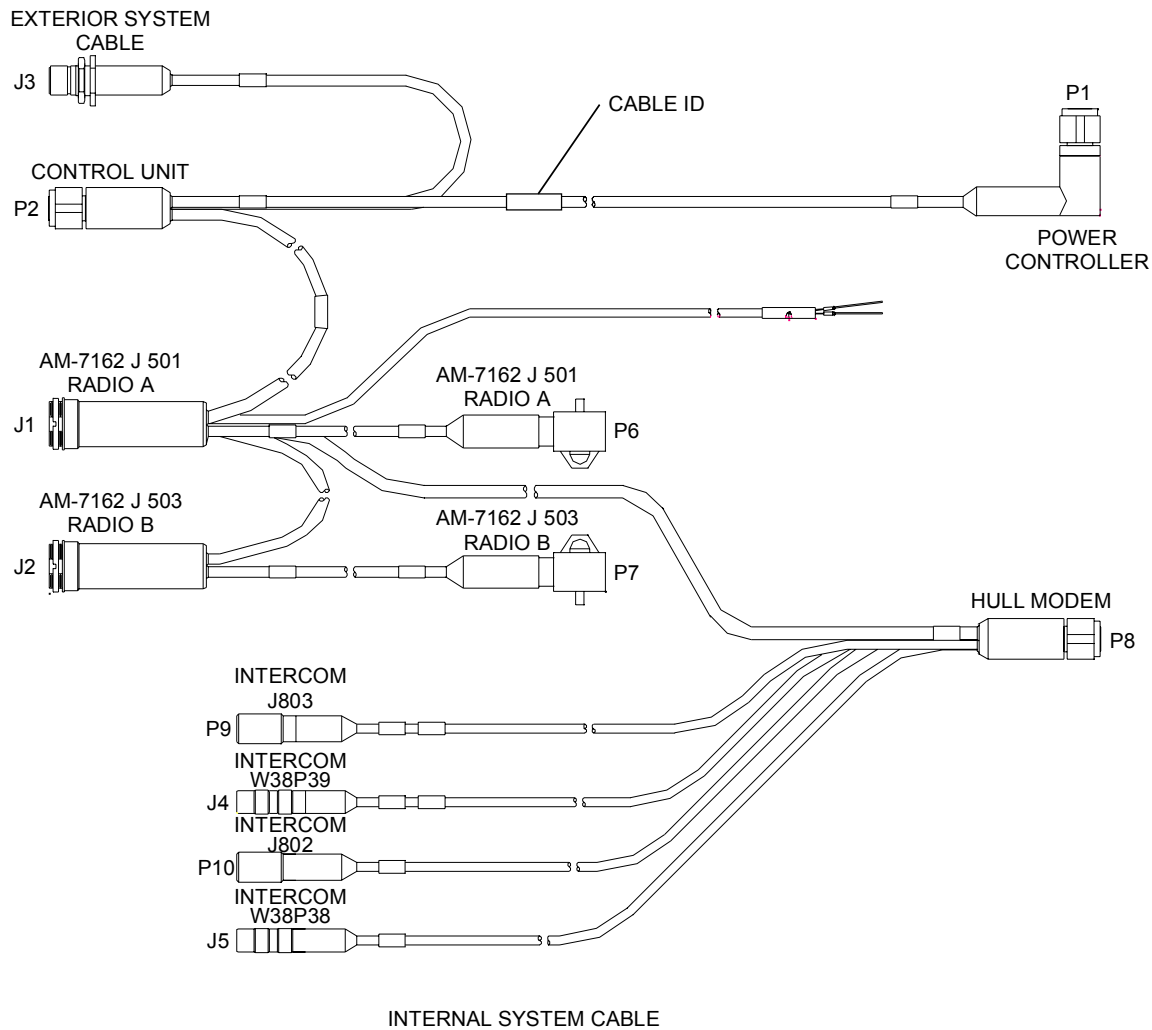


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Figure 2-23. Hull Modem.

2.3.2.10 Internal System Cable. (See Figure 2-24.)

- Inspect the entire length of the cable, making sure there are no bare wires exposed, and that the cable has not been damaged in any way.
- Inspect connectors for dirt and/or damage.
- Replace and report damaged equipment, as required.
- Route segment (J3-brown sleeve) to the external cable connector at the 6 o'clock vision block, and connect (J3) to (P8) of the External System Cable.



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146704

Figure 2-24. Internal Cable System.

- e. Route segment (P6) and segment (J1) to the AM-7162 amplifier. Disconnect the cable connected to J501 and connect (J1) to the removed cable connector. (See Figure 2-25.)
- f. Route segment (P7) and segment (J2) to the AM-7162 amplifier. Disconnect the cable connected to J503 and connect (J2) to the removed cable connector. Connect (P7) to the J503 connector and connect (P6) to the J501 connector.
- g. There will be two insulated wires, stripped at the ends and tinned, attached to the internal system cable near the segments connected to the amplifier. Connect either tinned wire to the (-) TEL/REMOTE binding post, and the other wire to the (+) TEL/REMOTE binding post on the AM-7162.

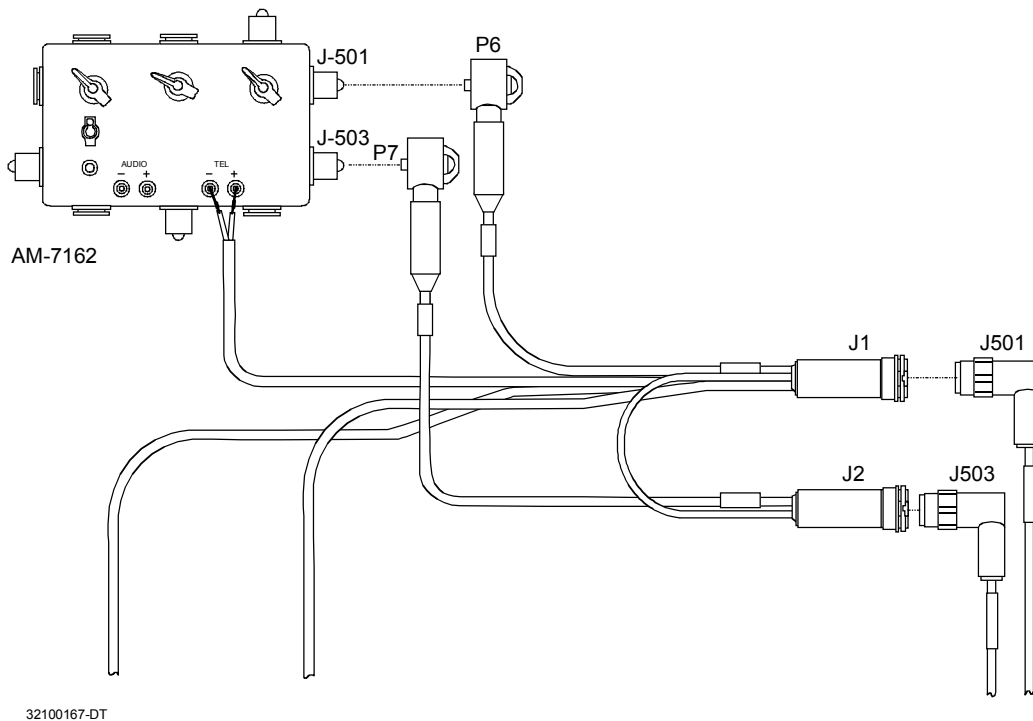
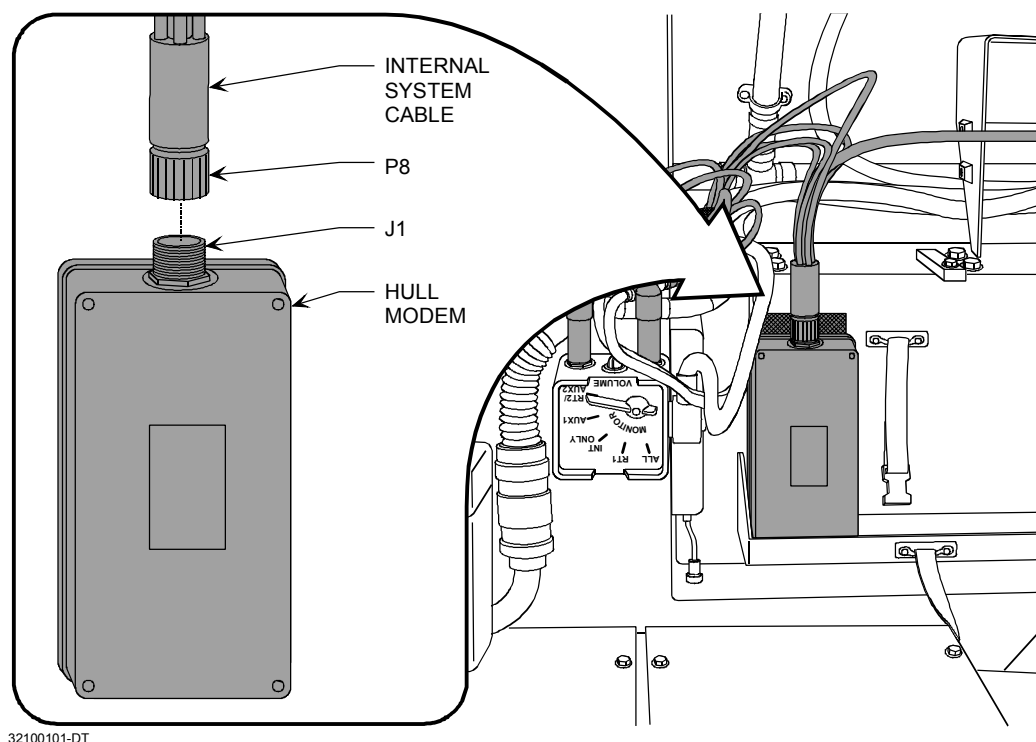


Figure 2-25. Cable Routing to AM-7162 Amplifier.

- h. Route segment (P8-orange sleeve) to the hull modem, and connect (P8) to (J1) of the hull modem. (See Figure 2-26.)



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Figure 2-26. Hull Modem Connection.

- i. Route segments (P9), (J4), (P10), and (J5) to the intercom unit at the gunner's station. (See Figure 2-27.)
- j. Disconnect the vehicle system W38P39 cable from the J803 connector on the intercom unit. Connect (P9) to the J803 connector. Connect (J4) to the removed W38P39 cable. (See Figure 2-27.)
- k. Disconnect the vehicle system W38P38 cable from the J802 connector on the intercom unit. Connect (P10) to the J802 connector. Connect (J5) to the removed W38P38 cable. (See Figure 2-27.)

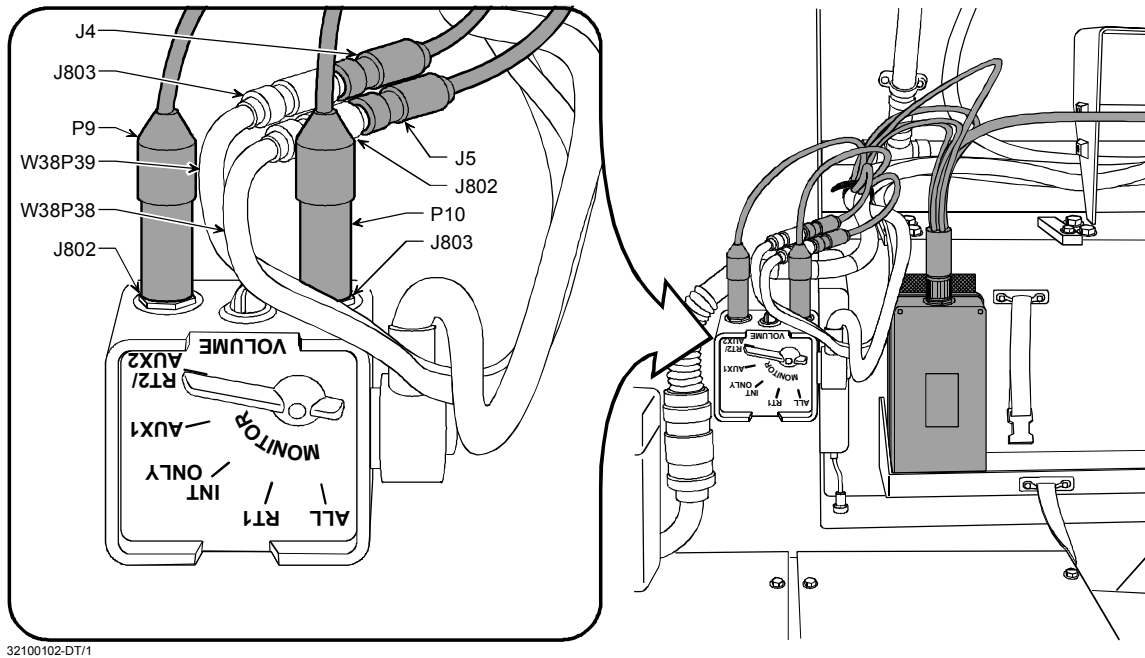


Figure 2-27. Intercom Cables Connection.

- l. Route segment (P2-red sleeve) to the CU, and connect (P2) to (J1) of the CU. (See Figure 2-28.)

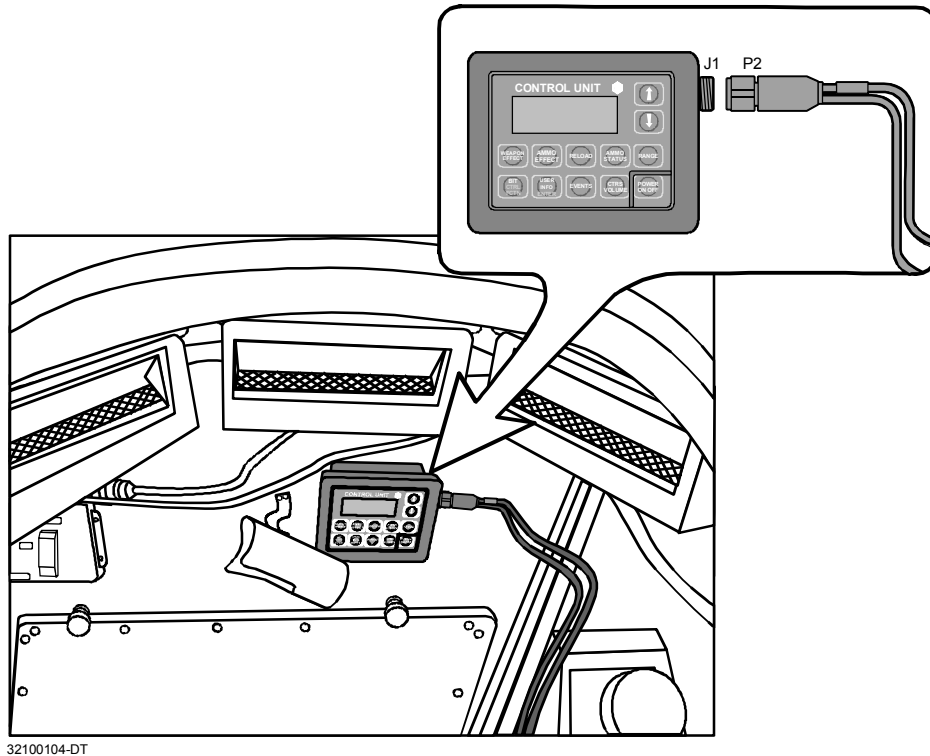


Figure 2-28. Control Unit (CU).

- m. Route segment (P1-violet sleeve) to the Power Controller, and connect (P1) to (J1) of the Power Controller. (See Figure 2-29.)

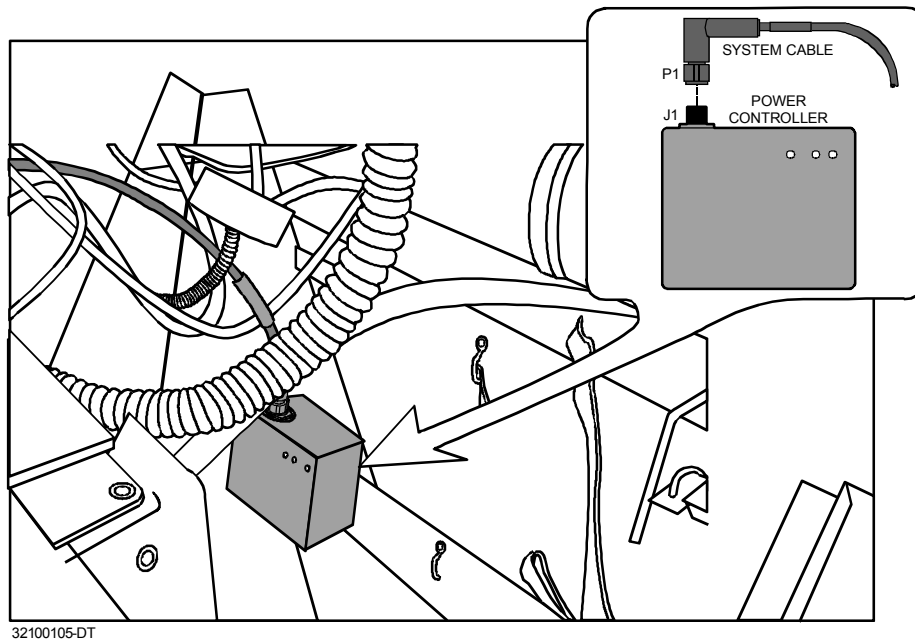


Figure 2-29. Power Controller.

- n. Secure all cables out of the way with fastener tape patches or tie-wraps.

2.3.2.11 Turret System Cable. (See Figure 2-30.)

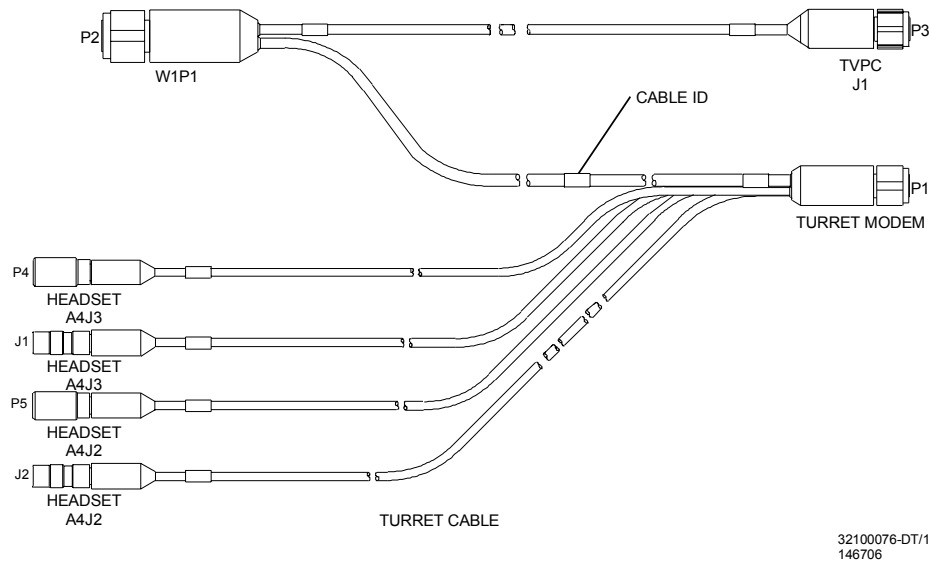


Figure 2-30. Turret Cable.

- Inspect the entire length of the cable, making sure there are no bare wires exposed, and that the cable has not been damaged in any way.
- Inspect connectors for dirt and/or damage.
- Replace and report damaged equipment, as required.
- Route segment (P1-orange sleeve) to the turret modem, and connect (P1) to (J1) of the turret modem. (See Figure 2-31.)
- Route segment (P2) to the vehicle system W1P1 cable, and connect them (See Figure 2-31.)

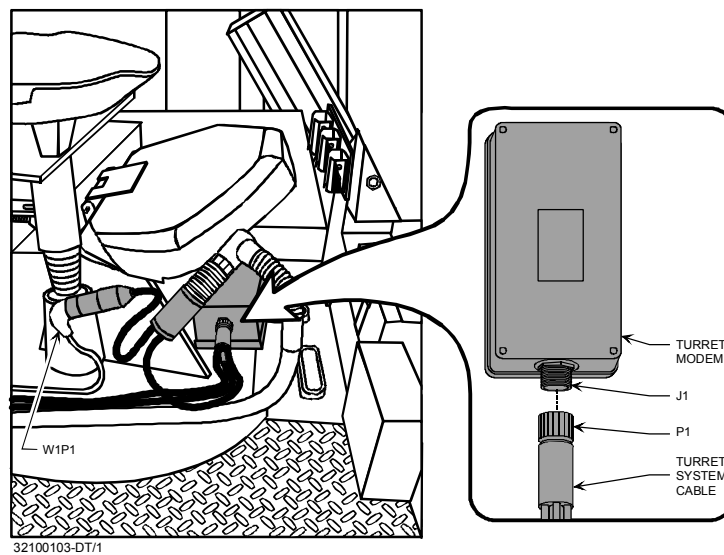


Figure 2-31. Turret Modem Connection.

- f. Route segment (P3) to the TOW Vehicle Power Conditioner (TVPC), and connect (P3) to the (J1) of the TVPC.
- g. Route segments (P4) and (J1) to the headset. Disconnect the A4J3 cable, and connect (P4) to A4J3. Connect (J1) to the removed A4J3 cable.
- h. Route segments (P5) and (J2) to the headset. Disconnect the A4J2 cable, and connect (P5) to A4J2. Connect (J2) to the A4J2 cable.
- i. Secure all cables out of the way with fastener tape patches or tie-wraps.

2.4 INITIAL ADJUSTMENTS, BEFORE USE, DAILY CHECKS, AND SELF-TEST REQUIREMENTS.

Before operating MILES 2000 equipment, perform the following:

- a. Ensure PMCSs described in Section II have been performed.
- b. Perform the Functional Checks described in Section V.

2.5 OPERATING PROCEDURES.**NOTE**

Ensure that the Power Controller is fully charged. A Power Controller near discharge will cause either BIT to continuously cycle when the system is powered up, or cause the system to continuously reset. Should this occur, turn the Control Unit off, start the vehicle, and allow the Power Controller to recharge for 15 minutes or replace the Power Controller.

2.5.1 Control Mode On Operating Procedures. (Refer to Table 2-3.) Upon power up, the control unit will come up with a vehicle status of “CHEAT KILL,” and the KSI will flash continuously. The Controller can reset the vehicle status by setting the CD/TDTD (Controller Gun) for “reset,” and firing at a detector on the vehicle. The KSI will flash once and the vehicle intercom will sound with “reset.” The vehicle may be made mission ready in one of two ways: 1) the Controller can set up information for the vehicle and weapons type on the MARS computer, and upload the information to the CD/TDTD (Controller Gun), then upload the information to the vehicle via the optical port on the KSI; or 2) the Controller can set the vehicle status to “Control Mode On,” and the required information can be set from the CU.

Table 2-3. Control Mode ON.

This is an aid to help you make the proper selections.

HOST PLATFORM	VEHICLE SIMULATED	WESS SELECTION
LAV-AT	LAV-AT	MISSILE ATWESS DRYFIRE

- a. Turn on the CU. MILES 2000 equipment should power up and automatically run BIT. Upon completion of BIT, the vehicle intercom will sound with, “**Audio Check**,” and indicate whether BIT passed or failed.

NOTE

During BIT, “Switch Test” will be displayed on the CU. Verify push buttons are working correctly.

- b. After the power on BIT completes, the system will be in a “killed” state, and will display “CHEAT KILL POWER SOURCE TAMPER” for approximately 7 seconds. The KSI will be flashing continuously. Using the CD/TDTD (Controller Gun), reset the system.
- c. Have the Controller Time Sync the system using a CD/TDTD (Controller Gun). Aim at any detector and pull the trigger. The KSI will flash twice.

NOTE

Use a CD/TDTD (Controller Gun) that has been Time Synchronized by another CD/TDTD (Controller Gun). This ensures that all the exercise units and CD/TDTDs (Controller Guns) have the same date and time.

- d. Set the CD/TDTD (Controller Gun) to Clear Events, and place the CD/TDTD (Controller Gun) into the Kill Status Indicator (KSI) Optical Port and pull the trigger.
- e. Press the EVENTS push button on the CU to verify that it has been cleared.
- f. Time Sync the system again using a CD/TDTD (Controller Gun). Aim at any detector and pull the trigger. KSI will flash twice.
- g. Change the vehicle status to “Control Mode On” by setting the CD/TDTD (Controller Gun) accordingly. Aim at a detector, and pull the trigger.
- h. The KSI will flash once, the CU should display, and the vehicle intercom will sound with:

**CONTROL MODE ON
(LIMIT 5 MINUTES)**

NOTE

Pressing any push buttons other than the following four will shut Control Mode Off: Up Arrow, Down Arrow, CTRL/FCTN (red label), and the Enter (red label) push buttons.

- i. With a vehicle status of “Control Mode On,” perform the following actions:
 - (1) Press the BIT/CTRL FCTN push button on the CU.
 - (2) The CU will display the main menu:

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTIONS**

- (3) Move the cursor to “HOST PLATFORM” and press ENTER. The CU will display a list of vehicles.
- (4) Move the cursor to your vehicle selection and press ENTER.
- (5) The CU will display:

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTIONS
RANGE MODE**

- (6) Move the cursor to “VEHICLE SIMULATED” and press ENTER.
- (7) The CU will display:

**DEFAULT VEHICLES
CUSTOM VEHICLES**

- (8) Move the cursor to “DEFAULT VEHICLE” and press ENTER. The CU will display a list of vehicles.
- (9) Move the cursor to your vehicle selection and press ENTER. The CU will display the Threshold screen.
- (10) The CU will display a default threshold of 125.

**USE ARROW KEYS TO
ADJUST MOTION
THRESHHOLD: 125
<ENTER WHEN DONE>**

Press ENTER.

NOTE

Should the vehicle assess a Cheat Kill after a Mobility Kill due to crew movement, turret movement, engine vibration, etc., ask the Controller to increase the vehicle’s threshold level.

- (13) The CU will display:

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTIONS
RANGE MODE**

- (14) Move the cursor to “HOST PLATFORM” and press ENTER. The CU will display a list of vehicles.
- (15) Move the cursor to your vehicle selection LAV-AT-07 and press ENTER.
- (16) The CU returns to the main menu and will display:

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTIONS
RANGE MODE**

- (17) Move the cursor to “VEHICLE SIMULATED” and press ENTER.
- (18) The CU will display:

**DEFAULT VEHICLES
CUSTOM VEHICLES**

- (19) Move the cursor to “DEFAULT VEHICLE” and press ENTER. The CU will display a list of vehicles.
- (20) Move the cursor to your vehicle selection (LAV-AT-19) and press ENTER.
- (21) The CU will display:

**USE ARROW KEYS TO
ADJUST MOTION
THRESHOLD: 125
<ENTER WHEN DONE>**

- (22) The CU will display a default threshold of 125. Press ENTER.

NOTE

Should the vehicle be assessed a Cheat Kill, after a Mobility Kill, due to crew movement, turret movement, engine vibration, etc., ask the Controller to increase the vehicle’s threshold level.

- (23) The CU returns to the main menu and will display:

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTIONS
RANGE MODE**

- (24) Move the cursor on WESS SELECTION, press ENTER. The CU will display the weapons for the vehicle you have selected. (Refer to Table 2-3 for WESS selection options.)
 - (a) WESS selection for the LAV-AT is as follows:

MISSILE – ATWESS

- (b) Select “MISSILE ATWESS” and press ENTER. The CU will display:

**MISSILE WESS
ATWESS
DRYFIRE**

- (c) Select “ATWESS” and press ENTER. The CU will display the Range screen.

**RANGE MODE
USER SELECT
ENTER FLIGHT TIME**

- (d) Move the cursor to “ENTER FLIGHT TIME” and press ENTER.

- (e) The CU will display the flight time.

**USE ARROW KEYS TO
ADJUST THE FLIGHT TIME:
<ENTER WHEN DONE>
TIME OF FLIGHT: 15**

- (f) Use the Arrow push buttons to adjust the time; select 15 seconds for time of flight and press ENTER. This returns you to the main menu.

**HOST PLATFORM
VEHICLE SIMULATED
WESS SELECTION
RANGE MODE**

- (25) Press the WEAPON SELECT push button on the CU. The KSI will flash once, and the vehicle intercom will sound with “Control Mode Off.” The CU will display:

CONTROL MODE OFF

2.5.2 LAV Loading/Firing Procedures.

NOTE

Prior to loading, verify that you can see through the sight properly. If you cannot, adjust the vehicle sight.

- a. Press the WEAPON SELECT push button on the CU and press ENTER.

**MISSILE – TOW II 0
USE ENTER TO SELECT**

- b. Move the cursor to “MISSILE” and press ENTER.

**LAV-AT
MISSILE – 1b**

- c. To load a missile, press the RELOAD push button. The CU will display:

LOADING MISSILE (“RELOADING MISSILE” for second missile)

Message changes to “LOADED” when complete (30 seconds).

WARNING

Visually check the TOW to see if the firing pin is protruding. If it is, **DO NOT** install the ATWESS cartridge as serious personal injury may occur. Fill out the appropriate deficiency form, and return the weapon to the issue facility/authority. Sign out another weapon.

- d. Load the ATWESS cartridges into the firing tubes, and arm the tubes by closing the breech door and securing it with the breech lock lever.
- e. Pull the TOW Tube arming plunger(s).

WARNING

Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local standard operating procedures.

- f. Select the missile to fire at the gunner’s control panel.
- g. Fire the TOW using normal missile firing procedure.
- h. For firing additional missiles, repeat steps c. through e. above.

WARNING

Your hearing can be damaged by an ATWESS cartridge. All personnel within 90 meters of an armed ATWESS must wear hearing protection.

WARNING

ATWESS cartridges may expel fragments/debris. Maintain prescribed actual weapon back blast danger/caution zones when using the ATWESS, or personal injury could occur.

2.5.3 Console Display at Night or Limited Visibility.

- a. Press either of the Arrow push buttons on the CU. This will light the display for 3 seconds.
- b. Make your selection. Once a push button is pressed, the display will stay lighted for 7.5 seconds, (or for 7.5 seconds after the last push button has been pressed.)
- c. After the last push button is pressed, and 7.5 seconds has elapsed, the display will return to the default screen. The display will then stay lighted for another 3 seconds.
- d. When BIT is run (from power on, or initiated by the user), the display will stay lit during BIT.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

2.6 ASSEMBLY AND PREPARATION FOR USE UNDER UNUSUAL CONDITIONS.

2.6.1 Unusual Environment/Weather. MILES 2000 equipment is ruggedized to withstand extreme changes in temperature, terrain, and environment. Therefore, assembly and preparation in unusual environment/weather should only require the caution necessary to ensure the safety of the operators and other participants.

2.6.2 Fording and Swimming. MILES 2000 equipment is waterproof and ruggedized. Therefore, equipment transport which requires fording and/or swimming should only require caution necessary to safeguard operators and participants, and to maintain control and accountability of the equipment.

2.6.3 Emergency Procedures. MILES 2000 equipment requires no additional procedures for emergency situations, as the equipment has been developed to be used for training simulations encompassing a great variety of conditions and levels of threat.

2.6.4 Communications Override Procedures. In the event of a Catastrophic or Communication Kill, the external communications can be over-ridden for emergencies. (See Figure 2-32.)

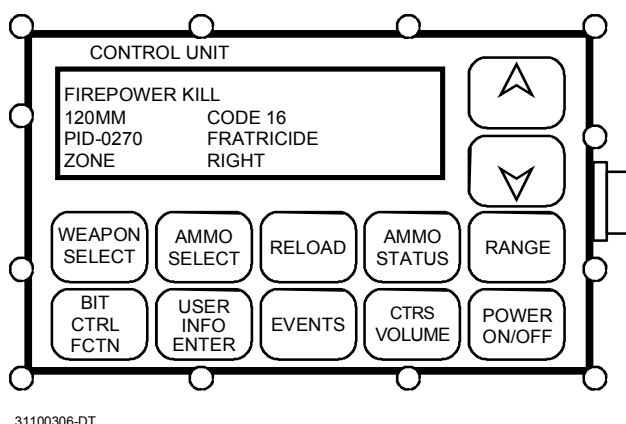


Figure 2-32. Control Unit (CU).

Press the USER INFO/ENTER push button. The CU will display:

XXXX	YYMMDD	HHMMSS	XXXX	= PID
□ COMMO		– DISABLED	YYMMDD	= DATE
			HHMMSS	= TIME

Press the USER INFO/ENTER push button (toggle) to Enable. The CU will display:

XXXX	YYMMDD	HHMMSS
□ COMMO		– ENABLED

SECTION V. FUNCTIONAL CHECKS

2.7 FUNCTIONAL CHECKS.

The functional check for MILES 2000 equipment is accomplished by the BIT performed by the CU. The CU will run the BIT, and the CU display screen will stay lighted during the test. Once the test has been run, the CU will display the results on the screen. Table 3-1, Chapter 3, Section I, Troubleshooting contains the list of possible error messages the CU may display with MILES 2000 equipment.

2.8 BUILT-IN-TEST (BIT).

To run the vehicle system BIT, perform the steps in Table 2-4.

Table 2-4. Built-In-Test (BIT).

ACTION	INDICATION
<p>Turn Control Unit (CU) ON.</p> <p>“SWITCH TEST” will be displayed on the CU.</p> <p>Press the “WEAPON SELECT” push button on the CU.</p> <p>Press the “AMMO SELECT” push button on the CU.</p> <p>Continue to do the switch test until you are satisfied that the push buttons are working properly.</p> <p>To continue the BIT, simply stop pressing push buttons.</p> <p>Read results of BIT.</p> <p>Reset vehicle with the CD/TDTD (Controller Gun).</p>	<p>CU display should light and stay lighted throughout the test.</p> <p>MILES 2000 equipment should power up.</p> <p>Vehicle intercom sounds with: “Audio Check,” then indicates BIT pass or failure. The KSI will flash continuously.</p> <p>CU will automatically begin the BIT.</p> <p>User may now test push buttons on CU to ensure the push buttons are working properly.</p> <p>The display should read “WEAPON SELECT.”</p> <p>The display should read “AMMO SELECT.”</p> <p>The display should match the label of the push button being pressed. Arrow push buttons should read “UP” or “DOWN.”</p> <p>The unit will automatically continue the BIT without further command.</p> <p>The display will indicate the following:</p> <p>BIT PASSED - Indicates an operational system.</p> <p>or</p> <p>BIT FAIL (with error message) - All or part of the equipment has failed the BIT or equipment is missing or not properly connected. Refer to Chapter 3, Section 1, Table 3-1 for further action.</p> <p>then</p> <p>“CHEAT KILL POWER SOURCE TAMPER.”</p> <p>then</p> <p>KILLED - The equipment has suffered a Catastrophic Kill. Contact the Controller.</p> <p>after reset</p> <p>READY - The equipment has passed the BIT and the mission may be continued.</p>

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

SECTION I. TROUBLESHOOTING

3.1 TROUBLESHOOTING PROCEDURES.

Following are troubleshooting procedures for problems which may be encountered with the MILES 2000 LAV configurations. Operator troubleshooting procedures involve identifying a problem and isolating the problem to the most likely piece(s) of equipment. Generally the BIT run by the CU identifies most problems within the system, and produces an error message to let the user know that there is a problem. Table 3-1 lists the error messages that are available; the MILES 2000 equipment malfunction most likely to cause the error message; and the appropriate action to take to correct the problem. You may notice that much of the time, the corrective action to be taken to resolve a problem is to remove the malfunctioning equipment and replace it with a unit that is working. This is because the MILES 2000 equipment is designed to need only limited maintenance at the operator and/or unit level. When the removal and replacement of equipment can be efficiently expedited, "downtime" can be cut dramatically, and participants can quickly return to the mission scenario, allowing them to receive maximum benefit from training. Removal and replacement procedures are located in this chapter in Section II, Operator Maintenance.

WARNING

To prevent personal injury, turn all system power off, including the CU, before conducting any removal/replacement procedures.

You may encounter equipment problems not addressed in this section. If this is the case, notify the appropriate personnel (a supervisor and/or higher echelon maintenance personnel) as soon as possible.

Table 3-1. MILES 2000 Troubleshooting Chart for LAV Configurations.

PROBLEM	PROBABLE CAUSE(S)	ACTION
No power to MILES 2000 - No LEDs lighted on Power Controller.	<p>Connection from system cable not secure or connectors damaged.</p> <p>Power Controller</p> <p>System Cable</p>	<p>Check system cable connection at Power Controller. Tighten if loose. Ensure connector is not damaged, and that there is no debris or foreign objects in connector.</p> <p>Check System Cable connection to vehicle slave receptacle. Tighten if loose. Ensure connector is not damaged, and that there is no debris or foreign objects in connector.</p> <p>Check Power Controller. If no LEDs lighted, remove and replace power controller.</p> <p>If problem still exists, remove and replace system cable.</p> <p>If problem still exists, refer problem to higher echelon maintenance.</p>
BATTERY POWER LOW LED lighted on Power Controller.	Batteries not fully charged.	Remove and replace Power Controller.
BIT FAILURE	PROBABLE CAUSE(S)	ACTION
Control Unit (CU) memory	CU	Remove and replace.
CU	CU	Remove and replace.
CU voice	CU	Remove and replace.
CU display	CU	Remove and replace.
No Kill Status Indicator (KSI) comms	KSI	<p>Check connections.</p> <p>Retest.</p> <p>If error is repeated, remove and replace.</p>
KSI Memory	KSI	Remove and replace.

Table 3-1. MILES 2000 Troubleshooting Chart for LAV Configurations – Continued.

PROBLEM	PROBABLE CAUSE(S)	ACTION
Strobe	KSI	Check connections. Retest. If error is repeated, remove and replace.
Modem-C memory	Modem	Remove and replace.
Modem-C commo	Modem	Remove and replace.
No hull modem commo	Modem	Check connections. Retest. If error repeats, remove and replace.
Turret modem memory	Modem	Remove and replace.
No turret modem comm	Modem	Check connections. Retest. If error repeats, remove and replace.
Belts/AMPL noisy	Detector belts	Replace amplifier on one detector belt. Retest. If error repeats, replace amplifier on each belt until the error no longer repeats. OR, remove and replace belts.
Front belt	Detector belts	Remove and replace Left/Front detector belt.
Rear belt	Detector belts	Remove and replace Right/Rear detector belt.
Left belt	Detector belts	Remove and replace Left/Front detector belt.
Right belt	Detector belts	Remove and replace Right/Rear detector belt.

Table 3-1. MILES 2000 Troubleshooting Chart for LAV Configurations – Continued.

PROBLEM	PROBABLE CAUSE(S)	ACTION
No attached TOW comm	TOW	Check connections. Retest. If error repeats, remove and replace TOW Tracker Head assembly.
TOW Tracker laser	TOW	Remove and replace TOW Tracker Head assembly.
TOW Tracker memory	TOW	Remove and replace TOW Tracker Head assembly.
TOW Tracker EPROM	TOW	Remove and replace TOW Tracker Head assembly.

SECTION II. OPERATOR MAINTENANCE

3.2 OPERATOR MAINTENANCE PROCEDURES.

Much of the operator maintenance for the MILES 2000 equipment consists of removing the defective item and replacing it with functioning equipment. Remove/Replace procedures for all LAV configurations are included in the following paragraphs:

WARNING

To prevent personal injury, turn all system power off, including the CU, before conducting any removal/replacement procedures.

3.2.1 Removal/Replacement Procedures for All LAVs.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1) wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth. **The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.**

3.2.1.1 M240 Small Arms Transmitter Removal.

- a. Detach the SAT adapter from the barrel of the pintle-mounted M240 machine gun.
- b. Remove the SAT and adapter from the gun barrel, taking care not to damage the equipment.
- c. Clean the equipment and adapter, and prepare for turn in.

3.2.1.2 M240 Small Arms Transmitter Replacement.

- a. Inspect the mounting adapter. Make sure the SAT is securely mounted to the adapter.
- b. Slide the SAT/adapter over the barrel of the pintle-mounted M240, and secure the adapter to the barrel.
- c. Torque to 60 inch-pounds.

3.2.1.3 Left/Front Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the vehicle. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn in.

3.2.1.4 Left/Front Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure cable by using fastener tape patches or tie-wraps.

3.2.1.5 Right/Rear Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the vehicle. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn in.

3.2.1.6 Right/Rear Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure the cable using fastener tape patches or tie-wraps.

3.2.1.7 Kill Status Indicator (KSI) Removal.

- a. Disconnect the External System Cable from the KSI connector.
- b. Disengage the rubber latches on the upper mounting adapter from the latching brackets on the KSI.
- c. Pull the KSI away from the mounting adapter, taking care not to damage the equipment.
- d. Clean equipment and prepare for turn in.

3.2.1.8 Kill Status Indicator Replacement.

- a. Apply fastener tape to the KSI, if needed.
- b. Match the KSI latching brackets to the upper mounting adapter latch positions, and secure the KSI to the adapter with the fastener tape patches or tie-wraps.
- c. Secure the rubber latches from the mounting adapter to the latching brackets on the KSI.
- d. Connect the System Cable to the KSI.

3.2.1.9 TOW Tracker Head Removal.

- a. Remove the Tracker Head assembly as you would the daysight tracker, taking care not to damage the equipment.
- b. Clean the equipment and prepare for turn in.

3.2.1.10 TOW Tracker Head Replacement.

- a. Replace the Tracker Head assembly as you would the daysight tracker.

3.2.1.11 TOW Simulator Tube Removal.

- a. Remove the Simulator Tube as you would the encased missile, taking care not to damage the equipment.
- b. Clean the equipment and prepare for turn in.

3.2.1.12 TOW Simulator Tube Replacement.

- a. Remove the dust cover from the electronics connector.
- b. Replace the Simulator Tube as you would the encased missile.
- c. If the display for the TOW does not indicate a missile is present, reseal the missile as firmly as possible.

3.2.1.13 Control Unit Removal.

- a. Disconnect the System Cable from the CU.
- b. Detach the CU from the vehicle.
- c. Clean the equipment and prepare for turn in.

3.2.1.14 Control Unit Replacement.

- a. Apply fastener tape to the unit, if needed.
- b. Mount the CU to the vehicle.
- c. Connect the System Cable to the CU.

3.2.1.15 Power Controller Removal.

- a. Disconnect the System Cable from the Power Controller.
- b. Detach the Power Controller from the vehicle, taking care not to damage the equipment.
- c. Clean the equipment and prepare for turn in.

3.2.1.16 Power Controller Replacement.

- a. Apply fastener tape to the bottom of the Power Controller, if needed.
- b. Attach the Power Controller to the fastener tape on the vehicle.
- c. Connect the System Cable to the Power Controller.

3.2.1.17 Modem Units Removal.

- a. Disconnect the System Cable from the Modem.
- b. Detach the Modem from the vehicle.
- c. Clean the equipment and prepare for turn in.

3.2.1.18 Modem Units Replacement.

- a. Apply fastener tape to the Modem, if needed.
- b. Attach the Modem to the vehicle.
- c. Connect the System Cable to the Modem

3.2.1.19 System Cable (all System Cables) Removal.

- a. Disconnect cable from all units and other cables.
- b. Detach the System Cable from the fastener tape patches or tie-wraps securing it to the vehicle.
- c. Remove the cable, taking care not to damage the cable or connectors.
- d. Clean the cable and prepare for turn in.

3.2.1.20 System Cable (all System Cables) Replacement.

- a. Replace the cable using the installation instructions applicable to the type of system cable and the type of LAV.
- b. Safely secure cables to the vehicle using fastener tape patches or tie-wraps.

3.3 DISASSEMBLY PROCEDURES FOR ALL LAV CONFIGURATIONS.

- a. Disconnect and remove the System Cable(s) and all MILES 2000 equipment in accordance with the removal procedures in Section 3.2.
- b. Remove batteries from applicable equipment.
- c. Clean and inspect equipment. If there is any damage to the equipment, report damage on the appropriate form (a separate form for each piece of equipment) and turn in with damaged equipment.
- d. Place equipment and System Cable(s) in the transit case.

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